MONTREAL STREET RAILWAY CONVENTION.

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STREET RAILWAY MEN TO THE FRONT.

INTEREST CENTERS IN MONTREAL, WHERE THE AMERICAN STREET RAILWAY ASSOCIATION IS HOLDING ITS CONVENTION THIS WEEK.

As every one knows, the annual meeting of the American Street Railway Association is being held this week in Montreal. The sessions last from Tuesday until Friday—a four-day convention. The hospitality of Montreal and its citizens is well known to electrical men, and the stay-at-homes are doubtless envious of their fortunate friends who are delegates to the meetings.

The preparations for this event have been carefully made, and a very interesting and profitable meeting is assured. Mr. Granville C. Cunningham, of Montreal, who is manager of the Montreal Street Railway Company and an executive committeeman of the American Street Railway Association, has been especially active in arranging for a proper reception to the delegates "from the States." Ample entertainment has been provided for the visitors, and Mr. Cunningham has seen to it that Montreal's reputation as a host will not suffer by comparison with previous efforts in this line.

The present officers of the American Street Railway Association, several of whom it is expected will be re-elected, are as follows:

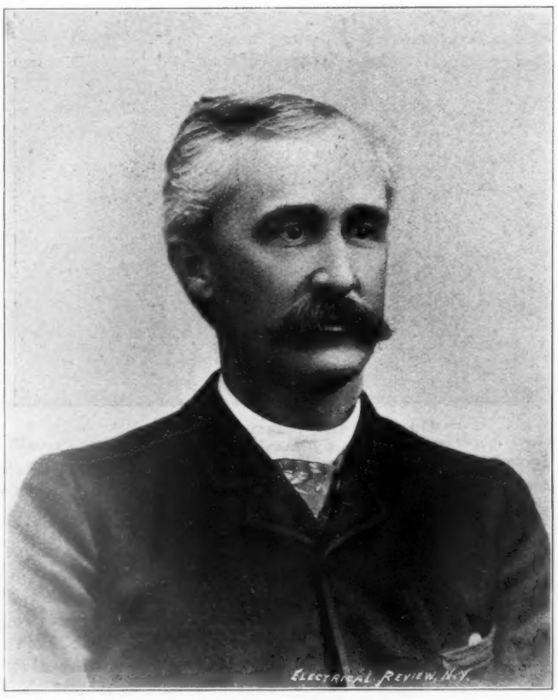
President—Joel Hurt, president of the Atlanta, Ga., Consolidated Street Railway Company.

Vice-presidents—W. Worth Bean, president St. Joseph & Benton Harbor, Mich., Railway and Light Company; John H. Cunningham, director Lynn & Boston, Mass., Railroad Company; Russell B. Harrison, president Terre Haute, Ind., Street Railway Company.

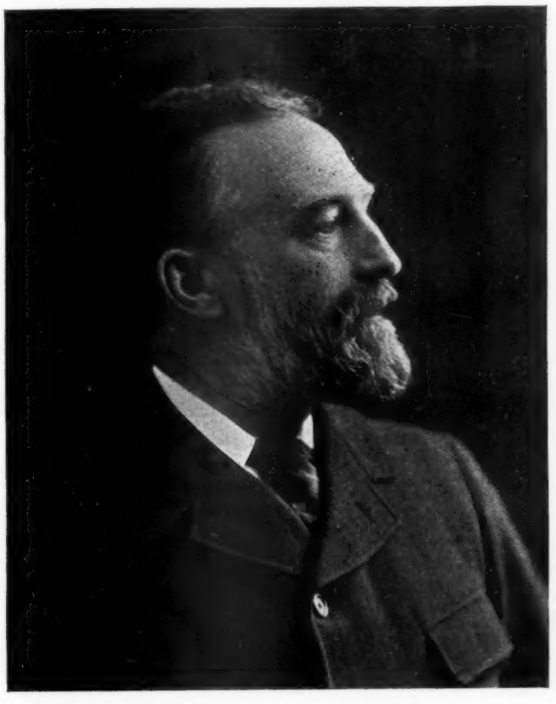
Secretary—Col. John N. Partridge, president Brooklyn City & Newtown Railroad Company.

The Executive Committee includes these gentlemen as well as Henry C. Payne, vice-president Milwaukee Street Railway Company; William H. Jackson, president Nashville Street Railway Company; D. G. Hamilton, president Cass Avenue & Fair Grounds Railway Company and St. Louis Railroad Company, and Granville C. Cunningham, manager Montreal Street Railway Company.

Special trains to Montreal are being run from Chicago and New York city, the former to arrive Monday evening and the latter Tuesday morning. The attendance will un-



JOEL HURT, OF ATLANTA, GA.
(PRESIDENT ATLANTA CONSOLIDATED STREET RAILWAY COMPANY.)
PRESIDENT AMERICAN STREET RAILWAY ASSOCIATION.



GRANVILLE C. CUNNINGHAM, OF MONTREAL,
(MANAGER MONTREAL STREET RAILWAY COMPANY.)
EXECUTIVE COMMITTEEMAN, AMERICAN STREET RAILWAY ASSOCIATION.

doubtedly be large, perhaps the largest in the history of the association.

A party of gentlemen left New York for the convention Sunday and Monday, including the following named:

John A. Brill, W. H. Heulings, Jr., of the Brill Co., Philadelphia; Chas. A. Bragg, of the Westinghouse Co., Philadelphia; J. H. Carson, Sterling Supply Co.; E. A. Record, Vacuum Oil Co.; A. C. Shaw, *Electrical Engineer*; John Graham, Jas. Fagan, Wilkesbarre & Wyoming Valley Traction Co.; E. W. Ash, Schuylkill Traction Co.; F. A. Lex, A. Whitney & Sons; A. McLeod, Lobdell Car Wheel Co.; A. Markle, Geo. Thompson, Lehigh Traction Co.; J. W. Morgan, Camden, Gloucester & Woodbury Railway; G. George Browning, Camden Horse Railroad; W. N. Sheaff, A. M. Jaastead, Staten Island Electric Railway; H. A. Sage, J. H. Reilly, Ogdensburg Street Railway Co.; E. F. Hutchins, Wilmington City Railway Co.; W. R. McAdoo, Paterson Railway Co.; J. R. Wilson, Climax Boiler Co.

A large party left New York Monday evening on the special train accompanied by Mr. M. C. Roach, general eastern passenger agent of the New York Central Railroad. General Superintendent J. C. Yager supplied five of the most modern Wagner palace cars, and the party started off in fine shape. Among the passengers were the following:

L. E. Roberts, New York.
W. F. Acton and two, Norwalk.
M. R. Cockey, New York.
E. J. Lawless, "
E. A. Simmons, "
E. H. Davis, Williamsport.
S. A. W. Dodge and wife, New Haven.
John F. Ostrom, Philadelphia.
Fred A. Scheffler and wife, New York.
Frank S. De Ronde, New York.
E. Peckham, "
Jas. P. McQuaide and wife, "
A. L. Johnson, Richmond.
F. A. Yates, New York.
Geo. F. Porter, "
W. J. Hammer, "
A. K. Baylor, "
C. W. Price and wife, New York.
H. C. Moon, Trenton.
Col. A. R. Kusor, "
R. S. Woodruff, "
J. H. Blackwell, "
Harold P. Brown, New York.
Chas. A. Schieren, Jr., "
R. H. Beach and wife, "
W. S. Silver, "
G. Fred Collins and one, "
H. R. Newkirk, "
E. W. Little, "
M. R. Conway, Brooklyn.
M. R. McAdoo, Paterson.
E. J. Wessels, New York.
Chas. Y. Flanders, Philadelphia.
H. C. Van Sant, "
A. M. Connett, Washington.
F. R. Ford, New York.
W. C. Wood, Brooklyn.
Geo. Chambers, Long Island City.
H. M. Montgomery, New York.
F. A. Thayer, "
W. L. Candee and wife, "
A. M. Young and wife, Waterbury, Conn.
J. F. McLaughlin, Philadelphia.
Andrew Adie, "
Geo. Lodge, wife and daughter, Philadelphia.
Geo. Kissam, New York.
C. E. Porter, Brooklyn.
Walter Chur, New York.
Fred S. Wardwell, Danbury.
Mason D. Pratt, Philadelphia.
J. A. Hanna, New York.
Jno. C. Dolph, "
H. J. Crowley, Philadelphia.
W. A. Washburn and wife, New York.
C. J. Field, New York.
Frank Silliman, "
Geo. L. Wiley, "

This party will start on its return trip Friday morning, spending the day at points in the Adirondack Mountains, and will arrive in New York Saturday morning.

Franklin L. Pope Killed by Electricity.

Franklin Leonard Pope was instantly killed by a shock of 3,000 volts in the cellar of his house at Great Barrington, Mass., Sunday, October 13. He was the manager of the Great Barrington Electric Light Company, and to facilitate the operation of the plant, he had placed in his cellar a large and powerful converter. When the power was turned on in the evening he visited the cellar to adjust the bearings. His family upstairs heard a heavy fall, and upon investigation found Mr. Pope dead on the floor beside the converter. Doctors say death was instantaneous.

Mr. Pope was born in Great Barrington in 1840, and was among the earliest electrical engineers in the country, and is a well-known inventor and technical expert. He leaves a widow and three children and two brothers, Ralph W. and Henry W. Pope. Mr. Pope met his death in the house in which he was born.

Prizes for Brooklyn Motormen.

President Clinton L. Rossiter, of the Brooklyn Heights Railroad Company, of Brooklyn, N. Y., on October 11 issued the following notice to conductors and motormen:

"The board of directors of this company has authorized the setting aside of $10,000 to be divided among conductors and motormen as follows:

"All conductors and motormen in service this date and who between now and May 1, 1896, shall have had no accident, causing either injury or damage to other persons or property, or to the company's property, and who have not been suspended for violation of the company's rules, will receive on that date a pro rata share of the above sum.

"The management desires to impress upon the employés that the success and prosperity of the company depend upon safe, regular, and quick car service, together with courteous treatment of the public by its employés, and the payment of this amount is authorized in the hope of securing more efficient and conscientious service on the part of both conductors and motormen, and thus improving the service on the company's lines."

ELECTRIC LIGHT FLASHES.

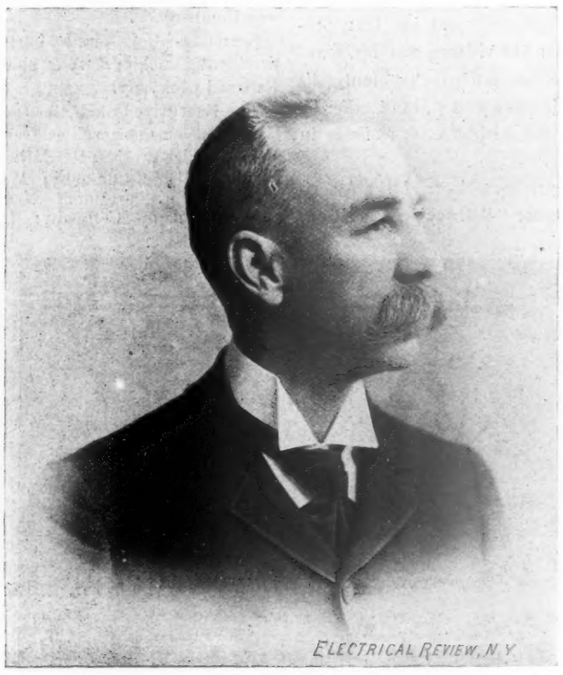
The official test of the municipal electric lighting station at Kalamazoo, Mich., shows the plant to be in excess of the requirements.

The Edison Electric Illuminating Company, of New York, has received permission from the Board of Electrical Control to lay conduits in Broadway above Fortieth street.

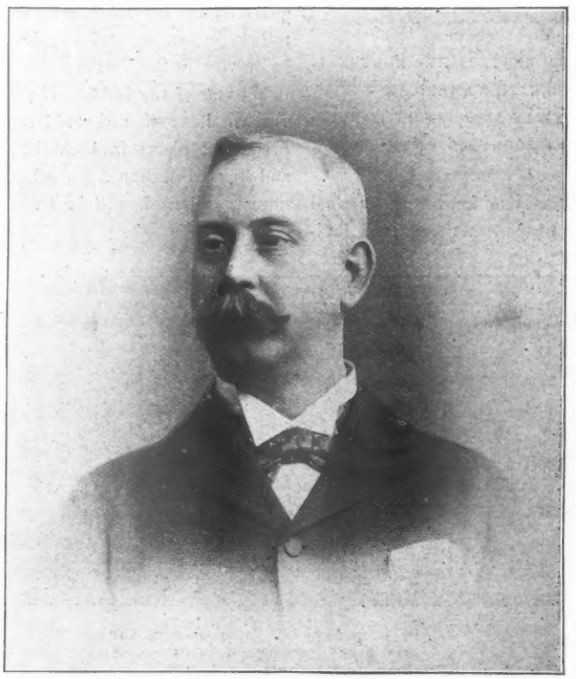
The Gulf Red Cedar Company, of Greenville, Ala., is figuring on installing either a private incandescent lighting plant or one to light both its factory and the town of Greenville.

The earnings for September of the Edison Electric Illuminating Company of New York, including the Harlem and Manhattan companies, were as follows:

	1895.	1894.	Increase.
Gross.....	$136,983 97	$125,605.68	$11,378.29
Net.....	61,462.50	56,563.48	4,899.02
Gross, 9 months.	1,331,157.77	1,171,884.74	159,273 03
Net, 9 months...	645,717.54	555,321.81	90,395.73



W. Worth Bean, of St. Joseph, Mich.
(President St. Joseph & Benton Harbor Railway & Light Company.)
First Vice-President American Street Railway Association.



Col. J. H. Cunningham, of Boston.
(Director Lynn & Boston Railroad Company.)
Second Vice-President American Street Railway Association.

INDUSTRIAL NOTES.

Mr. F. S. Burke has transferred his business of manufacturing the Crown woven wire brushes to the Crown Woven Wire Brush Company, of Salem, Mass. The Crown and Crown "K" brushes will be made by this company, of which Mr. Burke will be the manager. All orders will receive prompt and careful attention.

W. R. Brixey, 203 Broadway, New York city, manufacturer of the well-known Kerite brands of wire and cable, reports that his plant is extremely busy filling orders. These wires and cables are popular among street railway men. This firm has secured the order for the wire to be used in the new Ninth Regiment Armory, New York City.

ELECTRIC RAILWAY NOTES.

Work on the new electric railway between Williamstown and North Adams, Mass., has been started and will be pushed very rapidly.

The construction of the Lowell, Mass., & Reading Street Railway has been commenced, and it is expected that the cars will be running by January 1.

The Quincy & Boston company have obtained control of the Braintree & Holbrook electric road. Braintree and Holbrook people will appreciate the change, as it means a reduction in fares.

The South Boston Citizens' Association is endeavoring to secure a three-cent railway fare from Boston, and if the West End company will not make the reduction voluntarily, an appeal will be made to the legislature.

served at the Essex County Country Club.

Postmaster Sullivan, of Brooklyn, N. Y., received notice from Washington a few days ago that the propositions submitted by President Rossiter, of the Brooklyn Heights Railroad Company, to Second Assistant Postmaster-General Neilson, in regard to the establishment of two new trolley mail routes over that company's lines, had been favorably received by the postal authorities. A contract will accordingly be entered into between the government and the company as soon as the necessary arrangements can be made.

A party of directors of the United Tramways Company, of Dublin, Ireland, have come to this country to inspect the various systems of electric railways in the United States and Canada with a view to introducing the best one on their tram-

LATE NEW ENGLAND NEWS.

The answer of the National Telephone Manufacturing Company, of Boston, to the suit of the Bell company for infringement under the Berliner patent will be filed with the United States Circuit Court, at Boston, on October 15. While the answer itself will consist merely of a general denial of the allegations of the Bell company, it is understood that the National Telephone Company have a remarkably strong defense, and that when the case comes to trial, if it ever does, they may not content themselves with acting merely on the defensive. An aggressive policy is not always to be avoided. In the meantime, matters stand much the same as usual, and from present indications are liable to remain so for some time to come. When the fight does come on, the action of the other independent companies will be watched with considerable interest.

RUSSELL B. HARRISON, OF TERRE HAUTE, IND.,
(PRESIDENT TERRE HAUTE STREET RAILWAY COMPANY.)
THIRD VICE-PRESIDENT AMERICAN STREET RAILWAY ASSOCIATION.

COL. JOHN N. PARTRIDGE, OF BROOKLYN,
(PRESIDENT BROOKLYN CITY & NEWTOWN RAILROAD COMPANY.)
ACTING SECRETARY AMERICAN STREET RAILWAY ASSOCIATION.

The Worcester, Mass., Construction Company has begun work upon the new electric line from South Framingham through Ashland and Hollis-ton to Milford. With good weather it is hoped to have the road ready for operation before Christmas.

In about 10 days the first generator in the new power house of the Detroit Railway will be started. It will furnish power enough to run about 20 cars. All of the 75 cars of the company have been received, and will be put in service as soon as power can be provided. Only 38 cars are in service at the present time.

The first section of the South Orange & Maplewood, N. J., street railway was opened on October 12. A special car filled with the guests of President Frank Brewer started over the line at noon from the present terminus at South Orange avenue. After the inspection, a luncheon was

ways, which cover the city of Dublin and its vicinity. In the party are William Certe, chairman of the board; John R. Wigham, president of the Dublin Chamber of Commerce; William Murphy, a prominent politician and director of the *Freeman's Journal*, and William Anderson, secretary and manager of the company.

A dispatch from Niagara Falls, N. Y., states that the Niagara Falls Street Railway Company had been incorporated with the Secretary of State to construct a street surface railroad from Niagara street and Riverway, in the city of Niagara Falls, to the intersections of avenues laid out and known as Highland and Maryland avenues. The capital is $50,000. Directors, Arthur C. Denniston, Charles S. Hinchman, George L. Estabrooke, Jr., Joseph S. Clark, Robert J. Byron, James S. Simmons, E. H. Stewart, W. P. Horne and Spencer J. Lawrence, of Niagara Falls.

The Lombard Water Wheel Company, of Boston, Mass., in response to many inquiries from all over the country as to what their governor will do under circumstances presenting unusual difficulties, have just issued a neat little pamphlet embodying some very strong testimonial letters from leading concerns who have their governor installed, which answer effectually and in unmistakable terms the inquiries received, by showing what has already been accomplished in governing some of the most difficult plants to handle in the country, and which were found impossible to control in any other way. It is only fair to say that so far in their history the Lombard company have been confronted in every instance by problems of extreme difficulty in the line of governing, and in some cases have been called in as a last resort, after everything else had failed, and it became a question of either finding some effectual means of controlling their power or abandoning it altogether. In every instance where the Lombard governor has been installed under these circumstances it has done the work required of it, and it is consequently of little wonder that the testimonial letters submitted are strong and to the point. In addition to the letters mentioned above the pamphlet contains diagrams showing the close regulation of speed afforded by the governor under the severest kind of conditions in variations of load, as well as a full technical description of the apparatus taken from the columns of the ELECTRICAL REVIEW of March 27 and the *Electrical Engineer* of April 3, 1895. The pamphlet cannot fail to be of great interest to all now using or contemplating the use of water power for mechanical purposes, and particularly to street railway men, whose requirements in the way of close governing exceed those in almost any other line of work, owing to the sudden and great variations in load. The Lombard water wheel governor is especially adapted to this line of work, and a careful perusal of the pamphlet just issued by the company will thoroughly demonstrate the fact. H. G. T.

Boston, October 11.

A Handsome Souvenir Edition.

The souvenir issue of the *Street Railway Journal*, issued October 10, is published in honor of the Montreal convention of the American Street Railway Association, and contains extended articles on all the street railway systems of Canada, especially those of Montreal. In point of artistic and mechanical execution it ranks above anything heretofore published in this line. It contains hundreds of illustrations of street railway plants and portraits of street railway men.

Atmospheric Electricity and Bodily Health.

It is possible, and even probable, that the electrical conditions of the atmosphere have an important bearing on bodily health, says the London *Lancet*. As evidence of this may be instanced that tendency to headache, irritability and general malaise experienced by many persons just before a thunderstorm. Among the conditions that predispose to sunstroke in India there has been noticed that peculiar condition of the air "in which the hairs of a horse's tail repel each other, in which the hairs of the head stand on end, in which a man exposed to its influence becomes irritable, headachy and restless without knowing exactly what is the matter with him." Various observers have remarked that a thunderstorm is often preceded by an increased frequency of cases of heat apoplexy. Whether this phenomenon be strictly attributable to electrical conditions, to the heat, to some alteration in the respirability of the air or to other causes it is difficult to determine.

As to the source of atmospheric electricity there are many hypotheses, but little positive knowledge. The problem of the thundercloud still awaits solution; yet this would seem only to require a series of well-arranged laboratory experiments on a sufficiently extensive scale. In the meantime it is safe to say that the electrification of the air is in some way connected with the presence of water. Whatever be the determining cause, the air before a thunderstorm becomes charged with electricity, and a charge of opposite sign is induced upon the earth; in other words, the difference of potential between the earth and the air goes on increasing. The body of a man standing on the earth's surface, and having, therefore, the earth's potential, may be regarded as a discharging point doing its best to effect the restoration of electric equilibrium between the earth and the air in its vicinity. This process will continue until, either by a steady discharge or by the disruptive discharge of the thunderstorm, tension is relieved and equilibrium is effectually restored. The man has really been suffering from an accelerated rate of electrical discharge. Now if his body be regarded as a connection between earth and air it is to be remembered that the difference of potential between the two latter, and therefore between the head and feet of the man, is subject to various sudden and extensive fluctuations. A potential difference at one moment of 100 volts or less may in a few minutes rise to the same number of thousands. Experimenting in the Isle of Arran, Lord Kelvin found the difference of potential between the earth and an insulated burning match at a height of nine feet to vary from 200 to 400 volts, and "during breezes from the east and northeast it went up to 4,000 volts." He points out that "the gradual variations minute after minute through so wide a range as three or four to one, and not infrequently rising to 20 times the ordinary minimum, must have been due to positively electrified masses of air within a few hundred feet of the place of observation, wafted along with the gentle winds of five feet or 10 feet, or 15 feet a second." If, therefore, the body be subjected to such variations of potential as occur in fine weather between the earth and the electrified masses of air of which Lord Kelvin speaks, much more formidable must be the conditions that exist between the earth and the heavily charged thundercloud. The animal body, accustomed as it has become to its electrical environment, and little sensitive to the slighter fluctuations of potential, may nevertheless be seriously influenced by the severer manifestations of the thunderstorm. Questions of this kind raise some interesting points in connection with the therapeutic use of the so-called electro-static bath. This consists, as is well known, of the simple placing of the insulated body in connection with one or other pole of the static machine. Not that under these conditions the electricity is strictly "static" or at rest; the body of the patient is traversed by a current at very high potential which completes its circuit through the air. It is stated that with a four-plate Holtz machine the insulated body was brought to a potential of 30,000 volts, the current passing being about $\frac{1}{10000}$ of an ampere. For this procedure there are claimed well-determined physiological effects, such as increased action of the skin; an influence on blood pressure, as shown by sphygmographic tracings; an increase in the frequency and the depth of the respirations, as well as increased excretion of urea and phosphates.

Now, reverting to what has been already stated, it is evident that a living body exists on the earth under definite, although changeable, electrical conditions. In point of fact, it lives and moves and has its being in an electrostatic bath. The kind of bath—that is, the electrical condition of the air, and therefore of the earth—varies with the weather. There seems to be "a normal fair weather positive of natural atmospheric electricity." On a cloudy day the sign varies. How far do facts of this kind help to explain the influence of weather upon health? It has been suggested that, inasmuch as the neurasthenic, the gouty, the rheumatic and persons suffering from diseases of the spinal cord are better on a clear day than on a cloudy one, the indication is to treat them by negative electrification. It must be in the highest degree difficult to trace such effects to the electrical rather than to the hygrometric or other conditions of the atmosphere. Still, vague as such conjectures are, it is not impossible that the electrical conditions of the air may eventually furnish the key to treatment by the electrostatic bath.

The Monocyclic System in Salt Lake City.

The monocyclic system developed by the General Electric Company is about to be used in Salt Lake City, the distribution being made on the three-wire secondary method from large transformers. Most of the lighting will be confined to a space covering about six blocks, and as the blocks in Salt Lake City are 800 feet square the territory covered is somewhat large. A branch line will run from one corner of the district for about a mile along the best residential street, while another line will run out from another corner of the district for about 1,500 feet to the County and City Building. These lines will be gradually extended over other parts of the residential district as soon as the demand for such an extension arrives.

The station will be located on the railroad track 3,000 feet from the nearest side of the rectangular district of six blocks and 4,800 feet from the farthest side.

FIG. 3.—THE THREE-PHASE OR RECEIVING SIDE OF ROTARY CONVERTERS AT THE PORTLAND, ORE., TRANSMISSION STATION.

The generating plant will consist of two 150-kilowatt 2,000-volt monocyclic alternators, belted directly to two Buckeye engines. As the large blocks are more or less open, the center space being occupied by stores, barns, etc., room is thus afforded for the pole lines for the secondary wires around the inside of the block. From these the service wires will be run into the rear of the buildings. The plans contemplate the installation of two three-wire transformers to each block, one on each side of this interior court and the three-wire secondaries running around the court will be directly supplied from these transformers. As the number of lights in the block is increased, the transformer equipment will be expanded.

For lighting the residential districts from the branch lines the usual course of using small transformers will be followed bunching them as far as possible.

Motors are to be connected at once as required, the balance of wire being introduced only for motor work. The monocyclic system was selected chiefly on account of the facilities it offers for the economical operation of motors, and the fact that it allows of a practical solution of the day load difficulty.

THE PORTLAND, ORE., POWER TRANSMISSION PLANT.

AN INSTALLATION EMBODYING INTERESTING ELECTRICAL PROBLEMS.

(Concluded from page 199.)

The generators are of special design and are set upon the floor of the station, the armatures revolving in a horizontal plane, with one bearing at the floor line and another on top of the armature underneath the collector rings. Each generator has 20 laminated poles. The armatures are a little over seven feet in diameter and are about two feet high. These armatures are constructed to deliver current directly to the line at a working potential of 6,000 volts effective pressure without the intermediation of step-up transformers. On account of this high voltage, unusual precautions were necessary to perfect the insulation of the armature coils to avoid leakage to the ground. The armatures are wound with flat wire, and each of the coils is divided into sections, each section being separately insulated. The thoroughness with which the feat of delivering the enormous voltage direct from the machine has been accomplished can be judged by the fact that the armatures were subjected to a pressure of 1,500 volts alternating and were both short circuited and open circuited under full excitation without the slightest injury.

The field coils are wound for excitation of 500 volts continuous current and each has been subjected to a test of 5,000 volts alternating. The regulation in these machines has proved singularly good, the increase from no load to full load being comparatively moderate.

From the dynamos the leads are run to floor connectors and pass underneath the floor to the switchboard. The concrete floor is laid over them and thorough protection guaranteed.

The exciters are set up to allow of the armature revolving in a horizontal plane with one bearing only at the floor line. The construction of these exciters is almost identical with the General Electric multipolar type of railway generator, and each has a capacity of 250 kilowatts at 125 revolutions per minute.

The high tension switchboards are built of native marble and the panel method of construction is followed throughout. Each panel carries a double pole main switch for the high potential circuit and a double pole double throw switch for the exciting circuits. It also carries a rheostat for the control of the excitation of each machine and a single throw switch opening the circuit through a set of seven 32 candle-power 110 volts. In addition the board carries a current indicator for each line and one for the exciting circuit, and a potential indicator with station transformer placed at the back. The upper part of each panel consists of a set of plug connections for coupling the machines in parallel or for direct line connections from each generator.

The exciter switchboard consists of two panels of Tennessee marble with a special switching panel between them. By means of this switching panel current for the railway service in Oregon City can be obtained from either exciter, or the two exciters can be coupled in parallel, or the outgoing railroad current can be used for excitation purposes and the balance from the exciters can be used for other work.

From the generators the current passes directly to the line through the switchboard. The line is 14.3 miles long, a separate circuit being installed for each machine. It passes through an undulating country, following the course of the Willamette River as closely as possible. The poles upon which the three-phase wires are strung also carry a number of wires for the 5,000-volt continuous arc current from the old transmission station as well as the wires over which the old system of lighting with high frequency 5,000-volt alternating current is effected.

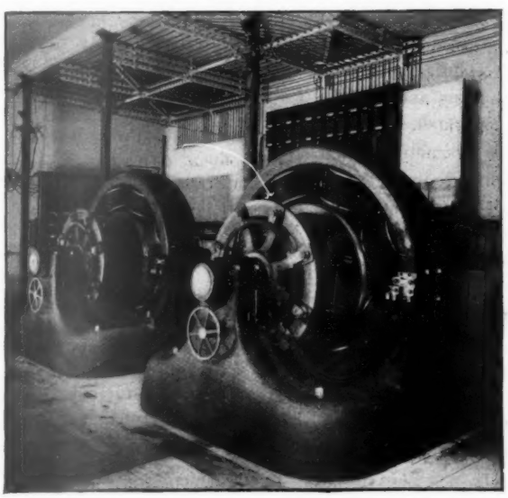


FIG. 4.—DIRECT CURRENT SIDE OF ROTARY CONVERTERS AT THE PORTLAND, ORE., TRANSMISSION STATION.

The loss in the long-distance transmission line is calculated at full load at about 11 per cent.

The sub-station to which the high frequency lines are brought is a two-story building at the corner of Seventh and Alder streets, covering a space of 40 feet by 100 feet. The lower floor is divided into three rooms, one containing the transformers, the second the rotary converters, the other being used for a repair shop, lamp and meter room. The upper story of the building is occupied by the offices.

In the transformation room at present are the necessary transformers for the three units already installed—45 transformers in all. The receiving end of each line is connected to a bank of 15 transformers per generator, five being placed between each pair of wires of the three-phase system. The transformers are mounted on an iron rack five transformers high and three wide, and foundations are already laid for six additional units. Each set of five transformers is connected to the primaries in series and to the secondaries in parallel, although in the transformation of the three-phase current two sets only are necessary. For the large units, with high voltages, however, as employed in the present installation, it is desirable to have a large number of transformers banked. The bank, therefore, is divided into three sets instead of two so that each group may act as a reserve to the other two sides, enabling two-thirds of the power of each generator to be delivered even if the transformers on one leg of the circuit have to be disconnected; nor is the balance of the system effected by this change of connection. The transformers regulate at a little over one per cent variation of the secondaries from no load to full load. The transformers are of the standard General Electric sub-station type, having numerous air passages between successive bunches of iron laminæ and between the coils so that they may be cooled by artificial ventilation. This enables the transformers to be worked at a high output of efficiency and yet remain cool. The distribution of light from the secondaries is effected on the Edison four-wire system, which allows of a large territory being operated from one transformer station and which also allows of the working of synchronous and induction motors from the lighting mains. The four-wire system is worked at 1,000 volts between wires and by means of feeder regulators a variation of four per cent in either direction is covered.

As already mentioned, the direct current for the railway service is obtained by conversion from the three-phase alternating current. This is effected by means of rotary transformers, a type of machine which the General Electric Company has brought to a high state of perfection. Two of these are at present installed in the sub-station and space has been left for an additional three. The capacity of each converter is 500 horse-power delivered to the bus-bars of the continuous current switchboard.

The long-distance transmission lines for this railway service, as in the case of the lighting circuits, are connected to step-down transformers, transforming the current from 6,000 volts on the line to 400 volts at the secondaries. The secondaries are connected to the three collector rings on one side and the current is thus brought into the armature of the rotary converter. The alternating current at 400 volts is then converted in this machine into direct current at 500 volts at no load and 550 volts at full load, delivered from the commutator side. The rotary converters are arranged for self regulation, the voltage on the direct current side compounding with the same regularity as that found in the best direct-current dynamos despite the varying losses on the long-distance line and the varying armature reaction in the rotary converter. This regulation is entirely independent of the generator, which receives constant excitation at all loads. The shaft of the rotary converter is extended 12 inches beyond the bearing of the alternating current side to take a small pulley, from which any small machine or an arc dynamo may be driven.

It is a noteworthy fact that, in spite of the long transmission line and the increasing load on the generator, the potential supplied to the railway lines steadily rises as the load is increased.

Each rotary converter has a capacity of 400 kilowatts. It is an eight-pole machine making 500 revolutions. The armature is ironclad, carrying at one side a commutator and at the other three collector rings.

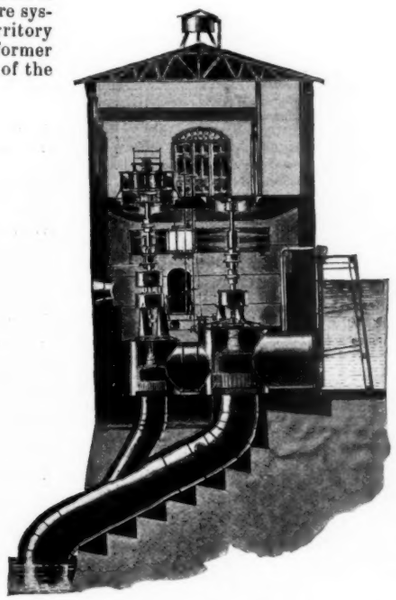


FIG. 5.—SECTION THROUGH THE PORTLAND, ORE., TRANSMISSION STATION.

From the rotary converters the wires are taken to the power switchboards. Each converter has two panels, one for the three-phase current and one for the continuous current. The alternating current panel carries two double pole switches, one for connection to the converters and transformers and the other to connect the converter to a set of common bus-bars. An additional main switch is provided to connect the rotary transformer and the panel itself, which carries also a set of fuses, three current indicators and a potential indicator, with a transformer, reducing the potential from three and one-half to one. The continuous current panel is of the standard direct-current railway type, with automatic circuit breaker, and a current indicator added for the fields of the rotary transformer. The panels may be coupled in parallel on both the alternating and continuous current side.

The lighting switchboards in the sub-station consist of one panel for each leg of the three-phase system. The secondaries from the transformers are entirely independent, and the panels carry fuses and two four-pole switches for coupling the feeders directly either to the corresponding transformer unit or to the bus-bars and the switches for the operation of the feeder regulators. A current indicator is placed on each side of the four wires and three potential indicators between the four wires. On top of the switchboards are placed the main switches for opening the different feeders, and each panel is provided with ground detectors and lightning arresters.

At present the lighting from the three-phase system is used for large buildings, containing several hundred lights each. They are close to the city station and this distribution can be readily handled at about 400 volts. For the outlying and residential districts the high-frequency apparatus with individual transformers will still be employed. Continuous current will be furnished to the railway and to the stationary motors already installed, but new motor installations will be made with the three-phase motors which will be run straight from the three-phase switchboard, in parallel with the rotary transformer.

The direct railway current will be carried to the East side railway station by means of cables under the Willamette River and this distribution will reach as far as Milwaukee, where connection will be made in parallel with the 600-volt service from either station A or station B at Oregon City. The loop from Oregon City to Portland and back will thus be as follows: Beginning at Oregon City with 33 cycle three-phase current at 6,000 volts, 14.3 miles will be traversed as far as Portland; the current will then be transformed to 400 volts alternating and passing through a rotary converter, issue therefrom at 600 volts continuous, which will be transmitted eight miles to Milwaukee and connect with the continuous current from Oregon City.

This plant when finished will be one of the largest long distance transmission plants in the world. Its satisfactory operation so far shows admirably not only the effectiveness of the three-phase transmission system for general service, but also its feasibility. This has rendered possible its adaptation to the operation of important railway systems through simple apparatus, and to the working of a distributing network composed in a large part of existing lines.

Cable vs. Elevated Road.

The latest development in regard to the Manhattan equipment is to the effect that a proposition is now being considered to equip the system with gas engines. The frightful inroads made upon this company's income by the traction roads of New York city render it necessary to do something shortly to check the stampede of business. The Manhattan company for the year ended June 30 carried 187,614,985 passengers; in the year previous 202,751,532, the decrease amounting to 15,136,537. The Metropolitan Traction Company in the year ended June 30, 1895, carried passengers to the number of 129,486,890 against 112,342,899, an increase of 17,143,991. The Third avenue system approximates its figures, showing its increase to be about 9,600,000. Thus has Manhattan's actual loss, as well as the natural increase in traffic, been the traction companies' gain. The Metropolitan Traction and the Third avenue system carried 8,695,800 passengers less than the four lines of the Manhattan company.

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SPECIAL NOTICE TO ADVERTISERS.

***CHANGES** for advertisements must be in this office by Friday noon for the following week's issue. **NEW ADVERTISEMENTS** should be in the office not later than Saturday noon to insure publication the following week.*

NEW YORK, OCT. 16, 1895.

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DEVELOPMENT OF ELECTRIC TRACTION.

The developments of the year in electric traction circles have been very gratifying to all connected with the street railway business and the future is full of promise. For these reasons, as well as others, the annual meeting of the American Street Railway Association, which is in session this week at Montreal, should be a most successful one.

Great strides have been made during the past few months in adapting the electric motor to various conditions and requirements of passenger traffic. We have seen old and conservative steam railways forced to give in to the competition of trolley roads and in self-defense adopt electrical equipment for short local lines. The electrical installations on the Nantasket Beach line of the New York, New Haven & Hartford Railroad and the Mt. Holly branch of the Pennsylvania Railroad have been proved to be successful, and a new era in combined steam and electric railroading is inaugurated.

The big electric locomotive in the Baltimore & Ohio Railroad's belt line tunnel at Baltimore has amply demonstrated its ability to outclass any steam locomotive as a traction motor for the purposes and conditions it was designed to fulfill. The underground trolley lines on Lenox avenue in New York city, and in Washington, D. C., have been perfectly successful up to date and bid fair to supersede the cable railway almost entirely.

We are promised an electric storage battery surface line in New York city, of which great things are expected. The new cable lines in New York have taken away so much of the traffic of the elevated railways as to force this unaccommodating corporation to follow in the footsteps of other steam roads and adopt an electrical equipment or else be forced to the wall.

Besides all these good things, electric railway apparatus has been steadily improved, as have also methods of operation and management.

Altogether, the street railway men of the country have much to be thankful for, and we have no doubt that they will fittingly celebrate the fact at Montreal. The ELECTRICAL REVIEW salutes the members of the American Street Railway Association and assures them of its continued cordial support and encouragement.

The ELECTRICAL REVIEW is entering more new subscribers on its list this Fall than ever before in a similar period.

WALL STREET AND THE ELECTRICAL STOCK MARKET.

The stock market of the week has been very quiet, narrow and professional. Speculators, usually on the bull side have refrained from activity pending the termination of the scare in Kaffir mining speculation in London. The bears have utilized the opportunity afforded by the clear field to sell stocks at intervals. On each occasion, however, they have been forced to cover their lines at a loss. Up to Friday night there were slight net declines in most stocks. However, owing to the increase in the short interest a lower level has not by any means been established. The news in the business world was in the main favorable. Sterling exchange has not recovered from its sharp drop of last week. Gold exports are over for this year at least. The demand for money for crop moving purposes and business enterprises generally is excellent and has resulted in an advance in interest rates. Two great commodities which up to recently failed to participate in the general advance in prices, namely, sugar and anthracite coal, have joined the procession. The prices of the latter are $1 per ton higher than they were in August, while silver, owing to the eastern demand by way of London and San Francisco, is on its way to 70 cents. If this figure be established it will result in a practical resumption of mining operations that will mean millions in net earnings to western railroads. The unfavorable factor of the week was the development of the war in freight rates among western roads. The effect of this was partially offset by further distinct progress in the Trunk Line Association towards an agreement to restore and maintain rates.

In the electrical field General Electric was the feature, the price ranging between 37½ and 38½. The mid-week decline was due to a decision by the United States Court of Appeals at Chicago giving the Western Electric Company the right to use the automatic regulator in electric lighting, patents of which were claimed by the Thomson-Houston Electric Company. Negotiations that have been opened between the Manhattan and Westinghouse companies based upon the gas engine as a motor, as was set forth in the ELECTRICAL REVIEW of last week, caused some little apprehension to holders of General Electric stock. The matter at the best is only tentative.

The Western Union annual report issued this week is of value in showing the general revival of business throughout the country. The surplus after dividends was $439,844. In 1894 it was $120,815; in 1893, $1,930,841. In the year the number of messages handled fell off 324,922. In 1894 they fell off, as compared with 1893, 7,959,651 or a total in two years of 8,284,553. The sharp decrease in number is not explained in the report. The stock of the company was more active than usual and slightly higher.

Considerable interest was mani-

fested in Erie Telegraph and Telephone in view of the activity and advances in the stock. The gain was from 61½ on Monday to 67 on Thursday. It is rumored that the next quarterly dividend will be 1¼ per cent, which would raise the rate from 4 to 5 per cent per annum. The directors will meet November 10 to make the declaration. The company has a surplus of $300,000. Some of the directors are in favor of making the increase now while others desire to wait six months longer.

As evidence that the Westinghouse stock is well distributed is cited the fact that checks distributing the dividend on the preferred were mailed to 1,426 different individuals.

On the Boston Exchange, Electric Storage Battery common advanced from 65½ to 67 and then reacted slightly. The preferred went from 69¾ to 70¼ and closed at about the opening figure. Toward the close of the week there was profit taking on a limited scale. The stock offered found a ready market, as is evidenced by the stability of the market. It is claimed by those interested that developments in prospect have not begun to be discounted. General Electric preferred declined from 69½ to 67 in sympathy with the movement in the common stock. Bell Telephone was without apparent feature between 199½ and 200. New England Telephone was steady around 90. There was no feature in Westinghouse securities. The common is quoted at 35½ @ 36¼, the preferred at 55 @ 55½. BAIN.

New York, October 11, 1895.

New York Directors of the Electric Storage Battery Company.

It was announced in Philadelphia on October 11 that the following additions to the board of directors of the Electric Storage Battery Company had been made: August Belmont, of the banking house of August Belmont & Company; John I. Waterbury, president of the Manhattan Trust Company, and Grant B. Schley, of the banking house of Moore & Schley. The new directors are all residents of New York, and their election completes the membership of the board.

American Institute of Electrical Engineers.

On account of conflicting dates the monthly meeting of the Institute at New York and Chicago has been postponed by direction of President Duncan from October 16 until Wednesday, October 23, the week following the Montreal Street Railway Convention. The papers to be presented are as follows: "The Local Annealing of Hard Faced Armor Plates," by Hermann Lemp, Jr., of Lynn, and "The Rotary and Behavior of Fuse Wires," by Prof. W. M. Stine, of Chicago.

The Home Telephone Company has been incorporated at Jersey City, N. J., with a capital stock of $300,000. It is reported that $100,000 of the capital has been paid in.

TELEPHONE NEWS AND COMMENT.

J. M. McKenzie, of Greenville, Ala., will soon install a telephone exchange.

The Clearfield & Mt. Ayr Telephone Company have completed their lines and central exchange at Clearfield, Ia., and are now operating exchanges at Mt. Ayr, Tingley and Shannon City.

An English firm has secured from the Japanese government a contract for 800 miles of submarine cable to be used in laying a line to Formosa. The Japanese propose to lay the cable themselves and will use cable ships of their own.

The directors of the Erie Telegraph and Telephone Company will meet on November 1 to declare the forty-eighth quarterly dividend, probably at the old rate of four per cent per annum. It is expected that within six months the rate will be raised to five per cent.

The New England Telegraph and Telephone Company last week opened an exchange with 38 subscribers at Stockbridge, Mass. The pole-line construction is especially substantial and inconspicuous, as it runs through side streets and not on the principal thoroughfares of the place.

The Erie Telegraph and Telephone Company makes the following showing for August and eight months:

	August, 1895.	August, 1894.	Increase.
Gross earnings	$88,744.90	$85,674.61	$3,070.29
Gross expenses	50,347.09	50,342.45	Dec. 4.64
Net earnings	$38,397.81	$35,332.16	$3,065.65
Increase of subscribers.....	210	121	89
	8 Months, 1895	8 Months, 1894	Increase.
Gross earnings	$699,555.52	$674,831.43	$24,724.09
Gross expenses	401,469.05	409,599.83	Dec. 8,130.78
Net earnings	$298,086.47	$265,231.60	$32,854.87
Increase of subscribers.....	1,196	129	1,067

The answer of the National Telephone Company, of Boston, to the suit brought by the American Bell Telephone Company, was filed in Boston on the 15th instant. It was a general denial. The National company are confident of winning, but did not disclose their defense, preferring to wait until the suit came on for trial. Rumors about an understanding having been reached between the National and Bell companies have been pronounced false by both sides and in fact have no foundation. It is safe to announce that the National company is not for sale and the rule of the Bell company has always been against the purchase of opposition, for if it once began there would be no end to it.

The New York *Herald* of last Thursday printed a despatch from Philadelphia with this heading: "Edison's Latest Scheme. It Is Said To Contemplate The Extraction Of Electricity From Waste Anthracite Coal." Strange to say, Mr. Edison "was extremely reticent" on the subject!

The "A-B" Arc Lamp.

In the ELECTRICAL REVIEW for May 8, 1895, was published the official announcement of the formation, by a number of gentlemen who had long been connected with the Brush company, of the Adams-Bagnall Electric Company, of Cleveland, Ohio. Since then the company has been quietly but steadily at work developing a line of arc and incandescent lamps. The arc lamp, described herewith, is known as the "A-B" lamp and some very high claims are made for it by the manufacturers. It is only 32 inches long over all and burns from 14 to 18 hours. It is a single carbon lamp with only one side rod which causes one shadow only to be thrown. This shadow can be taken care of against the pole or building, leaving the light intended for the street entirely unobstructed.

A valuable feature about the operation of the lamp is in the cut-out. It is well known that there are some standard lamps on the market which operate and cut-out perfectly at any reasonable number of amperes, provided that the lamp has been previously adjusted for the desired number of amperes. The "A-B" lamp, it is claimed, will operate and cut-out perfectly at any number of amperes from five to ten without any adjusting whatever. The accomplishment of this fact renders it feasible and easy for the station manager to run either 1,200 or 2,000 candle-power lamps, as suits his convenience, with the change of nothing except the ampere output of his dynamo.

The series lamp can be changed into a constant potential lamp and that again into an alternating lamp by simply an exchange of spools. All of the working parts of each lamp are mounted on one frame which is attached to the lamp casing by a single bolt and nut. By loosening this nut the working parts of one style of lamp are removed and those of another substituted. One style of lamp only need be carried in stock by the station manager and with the addition of several kinds of spools he will be prepared to furnish a lamp for any kind of circuit.

The "A-B" lamp will be furnished in any style—black japanned, yellow brass, oxidized copper, oxidized brass, Seventeenth Century brass, oxidized silver and aluminum. This provides an arc lamp good enough to hang up in a parlor, it being possible to match any style gas fixture or decoration. The casing being of cast-iron makes the lamp look solid and gives the ornamentations a dignified and substantial appearance.

The "A-B" lamp is the direct result of several months of close study and application by the engineering corps of the Adams-Bagnall Electric Company, headed by Mr. T. E. Adams, the inventor of the Brush-Adams lamp. The results obtained point to a lamp which will certainly take its stand at once among the leading lamps of the day, which assuredly means success for the new company. The officers of the Adams-Bagnall Electric Company are as follows:

Chas. G. Hickox, president; Geo. W. Howe, vice-president and treasurer; L. H. Rogers, manager; S. E. Cox, secretary; C. W. Phipps, superintendent.

OUR CANADIAN LETTER.

PETROLIA, ONT.—A radial electric railway between Sarnia and Florence, to run through this town, is being discussed.

LONDON, ONT.—The shareholders of the London Street Railway have authorized the issue of $250,000 in bonds for the purpose of changing the system to an electric power road.

PORT HOPE, ONT.—It is proposed to organize a company to operate a system of electric railways between Port Hope and Rice Lake, and also to connect with the Canadian Pacific Railway at Pontypool, Ont.

QUEBEC, QUE.—Work of construction will not be begun on the new electric street railway until next Spring. The delay is caused by the unusual engineering difficulties which the city presents.

MONTREAL, QUE.—The Central Light and Power company is being formed with a capital of $50,000, to supply electric light and heat to provincial towns, and also to manufacture electrical machinery.

HERBERTVILLE, QUE.—A company called the Co-operative Telephone Company has been formed to build and operate a telephone line in the counties of Lake St. John and Chicoutimi, with headquarters at Herbertville. Capital stock, $10,000.

MONTREAL, QUE.—The Belt Line Electric Railway from Montreal to Pointe-aux-Trembles is now being graded; work is being carried on in both directions. The contractors for grading work are Messrs. Leamy, Mills & Murphy, who will finish their work in November.

LONDON, ONT. — The London Street Railway Company are about to increase their rolling stock by 10 new electric motor cars. The car bodies are being manufactured in St. Catharines; the wheels at St. Thomas; the motors at Peterborough; and the trucks at Montreal.

GALT, ONT.—The Galt & Preston Electric Railway will be extended into the village of Hespeler in a few weeks. J. A. C.

Montreal, October 10.

A man over in Pennsylvania heard the other day that the ELECTRICAL REVIEW was a good paper. He immediately put a one-dollar bill and a two-dollar bill in an envelope with his name and address and on the envelope stuck a two-cent stamp and a *special delivery stamp*. The envelope was mailed in Philadelphia, which has been intimated to be a slow town. We think, however, that this is quick work in the subscription line and do not blame our new subscriber for wanting to be in a hurry to get the ELECTRICAL REVIEW.

SIGNALS ON ELECTRIC RAILROADS.

BY J. H. BARNARD, OF NEW YORK, BEFORE NEW YORK STREET RAILWAY CONVENTION, ALBANY, SEPTEMBER 17, 1895.

With the advent of mechanical power in the field of street railway operation came a consequent change in management and service. Within a short time we learned so positively the value of large, handsome, clean cars and good service, that to-day an ill-kept, untidy car is no longer the rule, but the great exception. The higher speed of the mechanically moved car decreased the headway, but instead of that lessening the number of cars required, the improved service so stimulated travel as to demand even a greater number than before. But, while the acme of clean, neat cars can easily be reached and maintained by all who pay for their care, the acme of good service is—like perfection—never reached. Even a high character of service requires the unceasing efforts of all the executive force in maintaining a discipline adequate to meet with precision the most unexpected emergency; but in spite of the high success in this direction, the lack of ability to promptly report troubles and to transmit instructions not only unduly tests the best organization, but robs it of much of its possible value. Railroads can afford telegraph operators at frequent intervals, as where their duties as operators are insufficient to warrant their salaries, they can fill various other duties; whereas this is not true of street railways. Signals, electric or mechanical, are too limited in their range, consequently the telephone is the instrument which can best replace the telegraph line in the hands of our class of employés. Over a two-wire telephone line any conductor or motorman can report in detail a trouble from any of as many stations as you desire to install, and prompt measures be dictated by the highest executive, if necessary.

This fills the want as far as communicating from an outlying point to the office, where there is always some one to notice the call bell; but, unless a separate wire be run from each station to the office, and that at a very considerable expense, there has not been heretofore, as far as I know, a means of setting a permanent signal at a desired point to arrest the attention of the next employé that may pass. This ability, however, even on a double-track road, is a very important one. A trolley wire has broken, and you want your linemen from some distant point with the least delay; a car is derailed, and unless you have a regular wrecking crew you want your truckmen with their jacks, linemen with their tackles, or both, and you want them as quickly as possible.

But however badly this ability is needed on a double-track line, it does not compare with its necessity on a single-track line. Your cars, from one cause or another—you that handle single-track lines know how various are the causes and how frequently they can present themselves—get out of schedule, "out of phase," you may call it, and no man living can get them back into phase by the easy methods that are usually apparent, because of your inability to give to distant crews orders complementary to those you would give to those near by. Consequently the requirements of a single-track road are that from any station, wherever you may be, you must have the ability to call and instruct the men at such points as the particular need demands without calling and so detaining the men at other points.

If this be rendered possible, you have gained yet another important power. If a station be located at each turnout, a man at any one of them can set a signal or communicate with another at the next turnout. And herein lies the greatest and only means of reducing to a minimum loss of phase, because in 99 out of 100 cases you may say always that general disarrangement begins in localized disarrangements. A car has an unusual number of stops to make, blows a fuse in starting on a grade, is blocked for a few minutes by a wagon across the track unloading, by a thousand and one insignificant things, consequently is late in reaching the next passing point. The car due to pass it there waits, how long? Well, it waits. Probably all its passengers are in high dudgeon, criticise the management and vow (and to a certain extent keep their vows) not to patronize such a line in the future. This is all bad enough, but this is only the beginning of the trouble. Each one of these cars is due to meet another car at its next turnout ahead, consequently a few minutes later two cars are awaiting two delayed cars, and again a little later at the second turnout ahead two more cars are waiting, and so it multiplies. If travel at the time be light, your cars may be able to pick up again their lost time, but usually a serious disarrangement occurs from the frequent stops of more than an individual car due to heavy travel. Then when it is of every importance that your cars should move like clockwork to earn every possible nickel, as well as to maintain your reputation, your cars are utterly at a loss. Through ignorance of the opposing car's position they will lose valuable time at a turnout, when, had they only known it, they might have proceeded to the next; or, after waiting a due length of time they proceed only to meet the other car between turnouts and one had to run back.

It is not that a single track road is, as many assert, not worth building. Many a route will support comfortably the investment required for a single track which would not pay the interest on the bonded debt of a double construction. Indeed, with the means of instructing the car crews when to wait and when not to wait, I assert that under ordinarily good management a single track road may handle smoothly an amount of travel that few will think possible. With such means at your command, or the command of your men, the loss of a schedule by one car can be easily kept to nothing worse. If you have extra turnouts to allow the employment on days of heavy travel of a larger number of cars than ordinarily, you may in the case of a sudden increase put out some extra cars to meet it as one would do on a double track road without previous warning to the men beyond the reach of your voice, and that without delaying their cars. Should travel not develop as prepared for, you may at pleasure withdraw your cars as they arrive without the remainder waiting at turnouts for cars that would never come.

Nor to do this do you require, except where the road can afford it, any one in the nature of a train dispatcher. If a car is late at a turnout, its crew does one of two things. If it is so much behind its schedule that the rule forbids its proceeding, one of them drops the signal at the next turnout where it is due to meet a car, and when one of the crew of that car answers at the telephone, he is told to come on, thereby limiting any loss of time to only that car which is already out of phase. As for itself, it simply falls back upon the schedule of the car following it, and on this car's right of way precedes it to the last turnout, where, transferring to the car behind any passengers it may still have, it turns back on its own schedule. Such a course entails a slight further delay to the passengers on that car alone, but none to any of the others.

If it is behind its time less than the limit established in the rules, it continues its way, first dropping the signal at the next turnout. Should it fail to reach that turnout on time, the opposing car will have waited for it, because when one of its crew went to the telephone he was not answered, showing that it must have been set to hold his car, presumably by the crew of the car due to meet him there.

This much towards keeping the cars informed of each others movements is an immense assistance, and to this extent an ordinary signal system, automatic or otherwise, is a great aid; but here a signal system has reached the limit of its possibilities; and still there is another common and most prolific source of general disarrangement, and that is where both of two approaching cars are that late the rules forbid their proceeding, consequently one lies at No. 6 turnout and the other at No. 8, when each might proceed to No. 7, without delaying any car and possibly finding themselves able to make up enough time not to delay other cars at Nos. 5 and 9, thus ending the trouble at its source. In this case the crew at No. 6 would have set No. 7 signal, as would also the crew at No. 8. Any one near the office instrument (an extension to the engine room can be cut in when at any time the office may be vacated so that the engineer may hear calls) noticing the repetition would understand the situation, and, calling up both cars, tell them to proceed.

Then, too, after every precaution has been taken to prevent general disarrangement, should one occur, and in spite of all it will occasionally, with the means of talking from whatever station you may be at to such crews as you desire, loss of phase loses much of its sting and trouble much of its victory.

CYNICAL FORBES.

THE PROFESSOR CRITICISES HIS BENEFACTORS.

Professor George Forbes, a cynical Britisher, who is "jumped on" quite as much in his own country as he is here, has gone to South Africa "on an important engineering project." Before he left England he arranged to have published, after his departure, a serio-comic article under his name in *Blackwood's Magazine*. The title is wonderfully original and striking—"Harnessing Niagara." There's little about Niagara and a great deal about the "Professor" in the story, whose title might more appropriately have been "The Egoist's I's; or, Seeing Nothing But Myself, Me, and the Professor." The literary quality of the article is as ponderous and ungainly as the lately developed Niagara word-fall. To fully appreciate Forbes's child-like revelation of himself and the wonderful variations that can be played upon the first person singular pronoun, one must read the whole article. Here's a small sample:

"I acquired quite a reputation on the New York Central Railway from a little Englishman. I had forgotten all about it when a friend at the Falls, arriving home from New York, said he had heard of me. "How is that?" I asked in the vernacular. "Well," he said, "you seem to be able to get the better of the conductors on our railways"—the most insolent class of men in the country. "I was talking to one on the cars, and when he heard I belonged to Niagara Falls he said, 'Oh, then you know Professor Forbes.' I said I did, and he said, 'Well, there's no flies on him.' I asked him why, and he said, 'One night we were coming from New York, and in the early morning six of us conductors were in the smoking-room yarning, when in comes Professor Forbes. He takes a look round and then says, "I want to smoke, but pray don't disturb yourselves; I am only a passenger;" and we all put our tails between our legs and slunk out, and then we roared with laughing to think how he had got the better of us in his quiet way.'"

The *Inland Printer* for October contains, among other interesting features, as handsome an example of three-color half-tone work as has come under our notice. The cover design is the work of a well-known decorative artist, Mr. E. B. Bird, of Boston. Other examples of Mr. Bird's work are given as well as an appreciative sketch of the artist. Mr. Bird received his first technical artistic training at the Massachusetts Institute of Technology and his many classmates, who are now engaged in the electrical and other technical professions, will be glad to learn of his success.

IS A FREIGHT OR MAIL SERVICE PROFITABLE OR UNPROFITABLE ON STREET RAILWAYS?

BY BENJAMIN NORTON, OF NEWBURGH, BEFORE THE NEW YORK STREET RAILWAY CONVENTION AT ALBANY, SEPTEMBER 17, 1895.

The simplest answer to this question is, Yes, if it can be performed at a profit, and No, if it must be performed at a loss. Now, apparently the question is solved, and I have no further need to discuss it. But as this is a subject which will eventually be taken up seriously by most electric railway companies, it is worthy of very careful consideration.

On a street railway which has no suburban outlet, and no direct or close connection with some other line which operates or can conveniently operate a freight service, it might be a very unprofitable venture to undertake this class of traffic. To-day, however, there is hardly an electric railway (and we will speak of electric roads only now, since horse power is a thing of the past) which does not have suburban outlets or chances for them. Therefore we may safely say that a freight service, as a general rule, ought to pay. Very few companies thus far have branched out into this field, and as I happen to be interested heavily in a line which has gone vigorously into the matter, I can tell briefly our experience and can show you what a successful feature of our business the freight branch of it is; so much so that we have a regularly organized freight department waybilling merchandise in regular steam railroad fashion and running regularly scheduled freight trains, all of which pays handsomely.

This line grew out of a tumble down horse railroad in the city of Newburgh, and after being rebuilt and extended and equipped electrically, we found ourselves tapping the rich Walkill Valley at Walden, 12 miles away, and terminating at the front door of one of the largest cutlery works in this country, running by all the stores and shops in town, and giving an opportunity besides to dairymen of Orange County to get their milk, butter and cheese to boats on the Hudson River at Newburgh inside of an hour, when formerly they had carted it the distance over the rough country roads, the teamsters spending pretty much the day at it and returning home at night, with their mule teams tired out and often a broken down wagon.

This line to-day, because it is a short cut in the first place, and because goods can be transported at low rates in the second place, is handling the dry goods and other merchandise for Walden merchants, shipped from New York to Newburgh by boat; the raw material for the cutlery works in the way of steel, brass, wood and other supplies and bringing back manufactured material, in cases; hay, straw and fruit, and condensed milk in cars from the Borden condensery, only two miles from our terminus at Walden. The road runs along the highway in some portions, and at other points the line is set well back from the roadway on independent property; and the farmers hustle their hay and straw in bales out the side gate to the track and stop the freight car handily, saving (besides 50 cents to $1.00 per ton freight) a long drive to the steam road freight house.

In the month of August the operating cost for handling our freight was a trifle over 40 per cent of the gross receipts. We ran three motor freight cars, carrying from eight to 12 tons each, and four flat or gondola cars as trailers, carrying from six to eight tons each. At Newburgh the line runs alongside the string piece of the steamboat dock, so that everything can be easily skidded between the boats and cars. We also run close to the Erie and West Shore freight houses and tracks, insuring an all year round New York connection, although as a rule the Ramsdell line of boats is out of service but one month in the year.

Some of our Walden friends remarked the other day that the Walkill Valley railroad people had soured on the trolley, because their freight trains in both directions were running through Walden without stopping, and they were discussing the notion of discharging their freight agent at that point. I may add that the past week we have hauled from Walden to the Hudson River, among other kinds of freight, about 75 tons of grapes, and the coming week we will do the same. The rate of 13 cents per hundred pounds net to us makes $2.60 a ton, which is a good rate, and requires but one trip per day of a motor freight car and trailer to get it. To earn the same amount of money with passengers would take the entire day and a regular full-day crew besides.

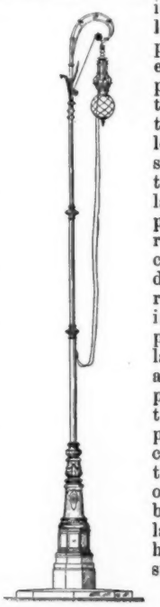
The experiments now being made by the New Haven railroad people on their Nantasket Beach road are probably not new to you, and it looks very much as though freight business on electric roads would not only be profitable in the near future, but generally adopted as a means of revenue by a large percentage of such companies.

As to mail contracts, while the government compensation is comparatively small, the actual cost to a company for performing the service is so little that they must be profitable to a certain extent, but aside from this no large corporation in a large city where the circumstances call for such a contract should overlook a special safeguard in time of strikes. During my presidency of the Atlantic Avenue Railroad Company in Brooklyn, we undertook to serve the government in this regard and prepared special cars. Part of these cars were devoted to mail matter and mail clerks, and part to regular passengers; so that while they were on the line they were earning money for the company from passengers, the same as other cars, and at the same time the United States mail sign always insured a clear track. Our experience during the strike of last Winter proved conclusively the value of a government contract for carrying the mails. The 19 cars on our Fifth avenue line which, by the contract, were permitted to carry the legend United States Mail were not molested, and we were able to keep that particular line open throughout the whole trouble. In view of all the circumstances, I believe a mail contract for a street railway is one of the most profitable things for a small one that they can undertake.

A Danish Arc Lamp Standard.

Mr. Robert J. Kirk, United States Consul at Copenhagen, Denmark, has sent the following report on an arc lamp standard to the State Department:

The general use of electricity as a means of illumination in our great cities must, in time, demand some other kind of support for the electric lamp than the unsightly wooden posts now so common. Especially is this need felt on our handsome thoroughfares, such, for instance, as the avenues in Washington. Here in Copenhagen, the question has been already taken up and solved, and there is now in practical use on Kongens Nytorv (Kings New Market), the principal public square of the city, a post for the electric lamp which is at once useful as well as ornamental. Herewith I give an illustration of the lamp-post as it appears in actual operation. The lamp-post is cast hollow, the wires enter from the ground and leave the post as shown in the illustration, and the lamp is held in position by a weight resting on a spiral coil. The lamp is drawn down when required by catching the ring suspended from the lamp with a hook at the end of a light pole, with which the workman is provided. The wires can be carried into the lamp in any other way desired, but to reach the lamp through the hollow post is considered here the most practical. These posts, 12 in number, are very much admired, and furnish at once a solid and lasting support for the lamp and a very handsome ornament to the street or square.



A DANISH ARC LAMP STANDARD.

The Blackening of Incandescent Lamps.

Mr. G. Tolomei recently published in the *Eletricitta* (Rome) an article wherein he gives the result of the microscopic examination which he made of filaments of incandescent lamps, before and after use, says London *Industries and Iron*. By the same means he also studied the pellicle deposited upon the glass.

The instrument employed by the experimenter magnified 850 times. A filament not yet used presents a regularly undulating surface; on the other hand, the filament of a lamp out of use is covered with minute protuberances, resembling in miniature those of arc carbons. The protuberances appear to have been produced by molten matter. Near the points of rupture and often elsewhere the filament seems to the naked eye to be covered with lamp-black; in these places, and especially near the rupture, it appears, under the microscope, furrowed with transverse cavities, like craters, from which spring ramifications of lamp-black, which have the appearance of volcanic jets.

The examination of a pellicle of a blackened globe shows that the deposit is much thicker opposite the point of rupture than elsewhere. This, according to the author, indicates that the cause of the rupture is the same as that which produces the blackening of the glass, and that it is in relation to the development of a gas proceeding from the filament. The theory according to which the blackening would result from a chemical change of charcoal by an oxide of residuum would not thus be correct. The hypothesis that a sublimation of the charcoal is produced, like that obtained by Moissan with the electric arc, could also not be sustained, for such a phenomenon would not give place to the ramifications just referred to.

The microscopic examination of the pellicle enables us easily to distinguish, in the very thin layer of lamp-black of which it consists, some larger grains, and irregularly distributed. These grains, says the author, often accumulate in strange forms. They may be considered as having been thrown from the filament, and having adhered to the glass.

Amongst these fragments he observed some yellowish crystals of different sizes; their transparency prevented his measuring the angles of their faces. These crystals can be easily detached from the glass, and appear to exactly resemble those of olivine. He does not attempt to prove their identity with this body, but it appears certain to him that they are made up of a substance formed in the filament, and which is found sublimated in proportion to the height of the temperature.

From these observations the author concludes that the destruction of the filaments is effected about as follows: Certain mineral bodies contained in the filament are melted by the high temperature, and in consequence of their evaporation the charcoal undergoes a progressive disintegration; certain very minute particles of carbon are thrown upon the glass. When the explosions of the minute protuberances of the surface are violently produced, whole fragments are detached, and it is in the places whence these fragments are detached that most frequently the rupture of the filament finally happens.

This explanation is not entirely satisfactory. Very fine filaments, richly nourished by the carburation (the carbon thus deposited containing no mineral substance), decompose and blacken the globes, as also those which have been feebly nourished. Besides, the degree of the blackening of the lamps and the durability of the filaments depend very largely upon the carburation of the latter, facts which are difficult to explain by Tolomei's theory.

That the formation of cellular conduits has a destructive effect upon the filament there is no doubt, but that the conduits owe their origin to the presence of mineral matter does not appear to be proved in a conclusive manner.

Some of the micrographic observations above described are not new; we only draw attention to the existence of remarkable yellowish crystals. The article concludes as follows:—"I also undertook the chemical examination of the filament, and of the substances deposited upon the globes; although this examination is not yet complete, it enables me to affirm that there is, while the lamps last, something other than carbon which leaves the filament, and that it is this which is the principal cause of the disintegration of the latter, and of the blackening of the globes, which is the result thereof. When my work will be terminated, I shall give the results in another note.

Electric Storage Battery Developments.

Factors are at work in the electrical storage battery field which, in the opinion of good judges, will revolutionize the electrical industry. They are in the nature of a development or a partial utilization of apparatus now employed in conjunction with the storage battery. The readers of the ELECTRICAL REVIEW are all more or less familiar with the comprehensive organization of Electric Storage Battery Company. As is well known, it owns something like over 700 patents on storage batteries, which are practically all in existence in the United States, France, Germany and England. These batteries develop an efficiency of about 85 per cent.

The management has been operating for some time upon two general lines, and one is calculated to utilize dynamos during their idle hours for charging the batteries, and the other to utilize waste in electrical operation, notably in the trolley systems.

Developments along each of these lines have now reached a point which promises speedy returns. A company has been formed in Philadelphia with a capital of $10,000,000, of which $5,000,000 is common and $5,000,000 preferred stock, to manufacture and lease batteries to those who have use for power, heat or light. It is figured that a dynamo is not in use on the average more than six hours per day. Allowing suitable time for repairs, etc., this generator, for use in connection with the storage battery, has a commercial value in the form of ability to return revenues during the 16 hours that it now stands idle.

The effect upon the earnings of an electric plant, as well as the profits to the battery company, in this way can be easily figured.

The other form of use is said to be even more promising of results. The waste of electricity in the operation of a large trolley system, similar to that of Brooklyn, is sufficient to light an entire city. It has been figured that an electric storage battery plant costing $150,000, worked in conjunction with a trolley system, will show a net increase in earnings of $100,000.

Plans have been matured by the Electric Storage Battery Company for the formation of a general finance company, whose object will be to underwrite all conversions that will have to be made to utilize the storage plants. The capital of this concern has not been decided upon, but the other details have been arranged. Its field of operations will extend to every city that has a dynamo, and its utility will be practically unlimited.

A practical application of the storage battery apparatus is shortly to be made on the Fourth avenue system of this city. Two cars have been built, equipped, and will be in operation by the last of October. They are to be run all Winter, and if they overcome the difficulties of ice and snow, they will be generally put in use on that road.

This company has recently elected five directors, who are Philadelphia men of excellent standing. Their names are Clement A. Griscom, president of the International Navigation Company and a director of the Pennsylvania Railroad; William D. Winsor, of the Winsor Line, Philadelphia and Boston steamships; Mr. Tuch, a capitalist, living in Europe at the present time; Mr. Rudulph Ellis, a retired gentleman with large means, and Mr. Joseph Sinnott, a wealthy liquor man and a director of the Reading Railroad Company. There are three more directors, who are coming from New York city, making a total of 15 directors, with those already on the board. This company seems to be very busy; it is said they are running their works overtime and likewise have expectations of very large contracts, one of which is a million-dollar storage battery contract. It is also said that a company is being formed to furnish capital to parties who desire to put in storage batteries, but have not the means available for expending the money, which means a very large increase to the business of the Electric Storage Battery Company. It is expected they will soon pay a dividend on the preferred stock and later on the common stock.

Electric Cars on the Brooklyn Bridge.

It is said that the New York & Brooklyn Bridge trustees will this week decide to replace the steam locomotives used for switching cars at the termini of the bridge with electric motor cars. The cable for the operation of cars across the bridge will be retained in service. The electric system contemplated is the Westinghouse-Wheeless contact point system. The two end cars of each train will be equipped with motors and these will be used only in switching the trains at the termini.

There is now at work in Detroit a negro motorman, the first ever appointed to such a position by a street railway company.

An Electric Car in a Flood.

Car motors are occasionally put to severe usage and as adversity is said to prove the worth of friends, so hard usage tests the value of motors. The accompanying illustration, taken from a snapshot photograph, shows what a trolley may at times encounter. During last Spring the freshests invaded Middletown, Conn., and for some days the water stood from 12 to 18 inches on certain streets through which the line of the Middletown street railway runs. The behavior of the motors is thus described:

MIDDLETOWN, CT., Sept. 23, 1895.

GENERAL ELECTRIC CO.,

GENTLEMEN — The photograph sent you a few days ago was taken last April by a party who was impressed with the novelty of a street car running through so much water (some over a foot).

AN ELECTRIC CAR IN A FLOOD.

Two of our lines run over this piece of track, which is our main track, and all cars made their regular schedule time for two days through this water, through the rise and fall of the freshet.

Through all this and hauling three and four loaded trailers, taking care of last Winter's snow, etc., we have had nothing burn out, not even a fuse strip. Our cars are all equipped with General Electric 800 motors and K2 controllers, and are giving us good service.

Respectfully,
E. W. GOSS, Supt.,
Middletown Street Railway Company.

Brooklyn Electrical Society.

At the regular weekly meeting of the Brooklyn Electrical Society, held on October 8 in the Edison Assembly Rooms, 360 Pearl street, Brooklyn, N. Y., Mr. E. Desnoult delivered a lecture on "Submarine Cables and Their Possibilities."

The four corners of the American Tract Society's new 23-story building at Spruce and Nassau streets, New York city, are ornamented by four circular glass lanterns enclosing arc lights.

Union Traction Company, of Philadelphia.

The Union Traction Company, of Philadelphia, became an established fact on October 7 by the signing of the lease of the Philadelphia Traction Company by Peter A. B. Widener, president of the latter, and John Lowber Welsh, president of the former corporation. After the lease had been formally signed and ratified, John R. Beetem, the general manager of the People's Traction Company, was made general manager of the Union Traction Company. The ELECTRICAL REVIEW learns on good authority that Mr. Beetem's salary will be $15,000 a year. It was determined to appoint an Executive Committee, consisting of five members of the Board of Directors and the president, which shall have full power to transact all the business of the company. This committee will formulate by-laws, arrange routes and have general charge of the operation of the road. The lease referred to above is known as a good example of the "air-tight" kind.

Increasing the Illuminating Power of Coal Gas.

A Frenchman has gone to considerable trouble to devise a complicated method of increasing the illuminating power of coal gas. It is said that the illuminating power may be increased 15 times by supplying a small and constant current of air to the flame. A tiny electric motor is fixed in the body of the gas lamp, which is a diminutive ventilator. The motor is run by a current supplied by a couple of small accumulators. The flame, it is reported, has a remarkable brilliancy, and lamps have been constructed on this pattern with an illuminating power of 800 candle-power.

Union Men Must Report.

The Brotherhood of Electrical Mechanics, of Chicago, has appointed a statistician in the person of J. S. Kelly. Each member must furnish a weekly statement to the statistician. To aid them in this work, the union furnishes the members with a printed postal card, which they must fill out and mail before Wednesday of each week. Failure to do so will cost him 50 cents. The blank form on the card is as follows:

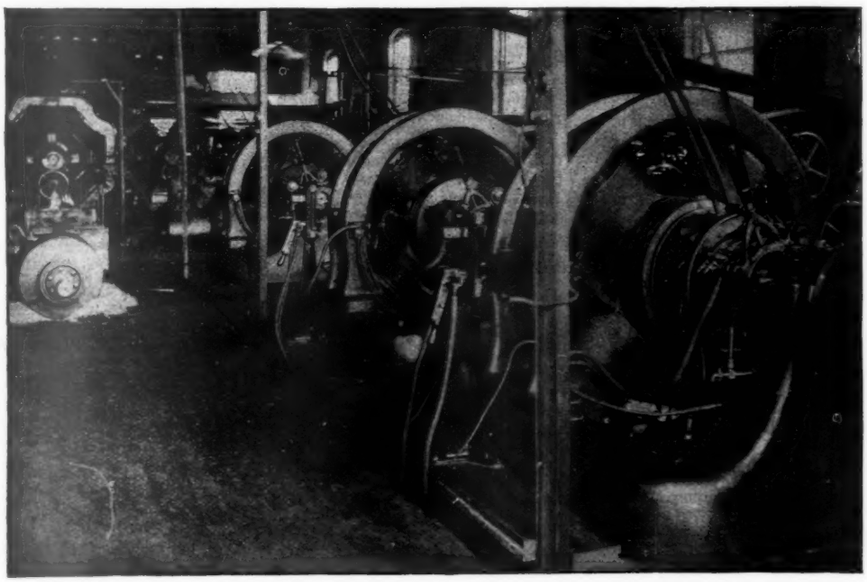
Weekly report of ——. Present residence, ——. Kind of work, ——. Name of employer, ——. No. of hours employed each day, ——. Wages: Per hour, ——. Overtime, ——. Sunday work, ——. Total hours overtime, ——. Sunday, ——. There are —— non-union men on job. There are —— helpers on job. Helpers receive —— cents per hour. Foreman's name ——. Other trades on job are —— unions.

A Philadelphia paper states that the full extent of the "trolley party" fad and the number of persons who have engaged in it is shown by the receipts of the four companies up to October 1. The amount received by the People's Traction Company is $17,000; the Philadelphia, $30,000; Electric, $20,000; and Hestonville, $3,000, or $70,000 in all. The average amount received from each participant is estimated at 10 cents, and this would show that 700,000 people have indulged in this amusement.

The Three-Phase Railway System at Lowell, Mass.

The company to which falls the honor of first using the three-phase system directly in its railway service is the Lowell & Suburban Railway, which, under the guidance of Mr. P. F. Sullivan, a man of energetic and progressive stamp, is now taking a step which should indubitably add largely to its revenues. The problem before the company was, how best to connect its terminus at Lakeview, a delightful resort on the lake, owned by the company, with the car line leading to Nashua, a good 15 miles away. The solution was found in the use of the General Electric Company's three-phase system, but not before careful examination had been made of its merits, from the points of view of economy, efficiency and durability.

Briefly, the principle of the installation is this: The three-phase current generator at Lowell, is, at a pressure of 5,500 volts, transmitted, part to a point about midway between Nashua and Lowell, and part to a sub-station at Nashua itself. It undergoes at both these points, first a reduction of pressure in static transformers, and then a conversion from the three-phase current in a rotary converter, emerging upon the feeder and trolley lines a direct current of 500 volts.



Generators for Supplying Current to the Lowell, Mass., Three-Phase Electric Railway System.

The three-phase generating plant is located in the power house of the Lowell & Suburban system, situated on Middlesex street. It consists of three 4-pole, 120-kilowatt, 900-revolution, three-phase generators, each of which is constructed to deliver alternating current at one side and direct current at the other. The direct current is called into action only after the main power plant, consisting of six General Electric multipolar 200-kilowatt belt-driven railway generators, is shut down.

The three-phase generators are compact machines and are connected by belts to a jack shaft which runs the entire length of the engine room close to the west wall. This shafting has been arranged to permit of any combination of engines and generators, the combinations being made by means of clutches. The generators are rated at 216 amperes. The three-phase current issues at a pressure of 360 volts and is carried to the switchboard, from which it passes to a bank of transformers erected on a platform placed in the cellar of the station and set between two of the engine foundations. These transformers are of the General Electric air-blast type. They are cooled by a blast of air driven through them by a rotary blower belted to a one horse-power motor.

From the transformers the three-phase current issues at a pressure of 5,500 volts, and is carried over insulated cables to a short distance outside the city limits, where it passes to the ordinary three-phase wires which run along the highway upon the same poles as carry the direct-current feeders. The three-phase wires are carried upon heavy wide petticoated glass insulators, set upon the side of the cross arm nearer the road, while the direct-current feeder cables occupy that part of the cross arm on the other side of the pole.

About six miles from Lowell, and a mile and a half from Lakeview, at a place called Eayr's Mills, upon the banks of the Merrimac River, the first sub-station has been erected. This is a wooden structure divided by a petition into two rooms, the outer or that nearer the line being occupied by the rotary converters and direct current switchboards; the inner containing the bank of reducing transformers, also cooled by air blast, and the three-phase switchboard.

The three-phase current is brought into this building from the pole standing nearest the station, over cables, to the transformers just mentioned. In these the pressure is reduced from 5,500 volts down to the original pressure of 360 volts. The current then passes into the outer room to the two rotary converters; it issues therefrom railway direct current of 500 volts pressure and is carried to the direct current feeders and trolley wires.

These rotary converters are similar in appearance to the three-phase generators, having at one side collector rings, at which the three-phase current is received, while at the other is a regular commutator from which the direct current is taken.

From the two converters the 500-volt current is carried to the feeders and is fed into the trolley wires, towards Lakeview and Lowell in one direction, and towards Nashua in the other, through a regular railway switchboard of panel construction.

The sub-station at Nashua is identical with that at Eayr's Mills. It contains two rotary converters, feeding part of the current into the main railway line from the Nashua end, and part into the city lines.

The operation of the rotary converters has proved entirely satisfactory. The machines have been subjected to heavy overloads, sometimes running as high as 50 per cent more than the rated capacity without any detriment. They run as smoothly as sewing machines and no trouble whatever has been experienced since they were first started.

The cars running between Lakeview and Nashua, are of special make and hold a place about midway between the steam railroad car and the familiar street car. They are fitted with 16 benches, and are mounted upon two independent trucks. They are equipped each with two General Electric 800 motors, controlled by "K2" controllers, the standard type of electric railway controller. The speed attained on the open highway between Lakeview and Nashua reaches as high as 30 miles an hour without difficulty.

The traffic between the two last mentioned points is already very large, and the line has brought the inhabitants of the two busy New England manufacturing cities almost within speaking distance. It enables also the inhabitants of the little hamlets scattered between to come to either for a moderate fare, which is only 10 cents for the entire distance, or five cents from either to Lakeview.

The carriage of freight by special freight cars has, we believe, not yet been contemplated, but now that the facilities exist this service will probably be started later on.

It is expected that the success which has attended this installation will be the precursor of a new era in travel; already numerous inquiries have come in regarding the possibility of the adaptation of the system to transmit between towns holding a relation similar to that between Lowell and Nashua.

PERSONAL.

Dr. John Hopkinson, of London, visited Baltimore last week to investigate the operation of the electric locomotive in the Belt line tunnel.

Mr. Thomas B. Doolittle, special agent of the American Bell Telephone Company and one of the genuine pioneers in the telephone business, gratified his many New York friends by visiting them last week.

Dr. Theodore R. Timby, who is said to be the inventor of the turbine wheel, is now living in Chicago. At 72 years of age, he is reported to be as hale and active as most men of 50. Dr. Timby is a native of Dutchess County, New York.

Mr. Stephen D. Field, the well-known electrical inventor, ran down from his Summer home at Stockbridge, Mass., for a holiday in the metropolis last week. About November 1, Mr. Field will take up his residence for the Winter in Boston.

Dr. Louis Duncan, of Baltimore, president of the American Institute of Electrical Engineers, visited New York last week. Dr. Duncan is spending the present week at Atlanta, Ga., as a member of the Commission of Awards of the Cotton States and International Exposition.

Charles H. Barritt, president of the Schuylkill Electric Railway Company, was badly hurt the other day in Philadelphia by being thrown to the ground while hurriedly alighting from a street car. Mr. Barritt's accident has necessitated the postponement of a contemplated European trip.

Mr. Thomas L. Hamilton, a member of the Board of Electrical Control of New York city, has been nominated for County Clerk on the fusion ticket. Although but recently appointed a Subway Commissioner and with little previous knowledge of electrical matters, Mr. Hamilton's business-like methods have made a good impression upon his associates in the board and upon the electrical men who have come in contact with him.

Mr. J. G. White, of the White-Crosby Company, Baltimore, is somewhat of a bird of passage, spending his time between New York, Tonawanda, Baltimore and various points in the West. Mr. White's company has recently completed the Buffalo & Niagara Falls Electric Railway, one of the best constructed roads in the country. As an engineer, business man and gentleman, Mr. White occupies an enviable position in the electric railway field.

Mr. Timothy W. Sprague, who has had an extended experience in electrical mining work with the prominent manufacturing companies, and has been consulting engineer on several recent electric mining plants, has assumed the management of mining and power transmission work with Charles H. Davis, consulting engineer, and has moved his offices from the Postal Telegraph building to the Fidelity and Casualty building, 99 Cedar street, New York city.

ADVANCE INFORMATION.

VALUABLE INFORMATION FOR MANUFACTURERS AND DEALERS.

We publish below the earliest information obtainable relating to new electric railways, new electric light companies, new telephone companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW from week to week.

New Electric Railways.

BRADDOCK, MD.—The Frederick & Middletown electric railway, of Frederick, will build its electric power house at Braddock Springs.

SAGINAW, MICH. — The Saginaw Street Railway Company has been granted a 30-year franchise, and it will probably construct an electric line to connect Saginaw with Bridgeport.

CLEVELAND, OHIO.—The Wadsworth Electric Railway Company has been granted franchise to construct, maintain and operate a street railway from Brooklyn to Medina and Wooster.

JONESBORO, IND.—Work will be commenced on the Clodfelter electric line. Contract has been let for 2,000 feet of track in Jonesboro.

BOULDER, COLO.—The Mexican Industrial Railway Company has been incorporated by Benjamin P. Cherry, of Boston; Stephen W. Reynolds and Walter S. Wait, of Newton, Mass.; James N. George, of Plaiston, N. H., and Arthur P. Cushing, of Boston. The object of the company is the construction of electric railways, telephone and telegraph lines for the city of Mexico. Capital stock, $100,000.

HUGHESVILLE, VA.—Atmospheric Railway and Power Company has been incorporated by G. W. S. Turner, Jamesburg. Capital stock, $1,000,000.

MONROE, MICH. — The Monroe Electric Railroad Company has been organized with W. H. Cowles, of Monroe, president and general manager; F. G. Strong, secretary; L. E. Watkins, treasurer. Capital stock, $50,000.

MILWAUKEE, WIS.—The Chicago & Wisconsin Inland Lakes Railroad Company has been incorporated by A. E. Case, Frank Boden, S. Marcus Rothschild, A. J. Toolin and G. D. Green, to build an electric railway from Chicago, Ill., to Madison, Wis., and branch lines to the lake resorts. Capital stock, $10,000,000.

NEW YORK, N. Y.—The Bergen Traction Company in New Jersey has passed into the hands of the Elkins syndicate of Philadelphia.

BROOKLYN, N. Y.—The Lewis Car Company has purchased the plant of the Fowler Car Company, at Elizabethport, and will begin the building of street cars.

BAY CITY, MICH.—The Consolidated Street Railway Company has made contracts with both the Rapid Transit and Interurban companies, which propose to build lines between Saginaw and Bay City.

LUZERNE, PA.—The contract for building the electric road from this place to Harvey's Lake has been awarded to Carle & Flanaghan.

TROY, N. Y.—The white line cars to Cohoes via Green Island will soon be running by electricity.

CHITTENANGO, N. Y.—A dispatch from Albany states that the Chittenango & White Sulphur Springs Railway Company was incorporated recently with a capital of $150,000. The directors are Charles F. Pennock, George Walrath, George C. Clark, Walter H. Stewart, Luke McHenry, William H. Young, of Chittenango; Walter J. Roberts, of Franklin, N. J., and Henry C. Blackman, of Brooklyn; William Suthpin, J. F. Sprain, J. B. Dickinson, Austin J. Roberts, Henry E. Parkson, K. J. Matheson and J. F. Clark, of New York city.

CHICAGO, ILL.—The Chicago & Northern Pacific is to be changed to an electric road and the suburban trains of the Illinois Central at Chicago are to be run with electric motors.

IRONDEQUOIT, N. Y.—The Irondequoit & Lake Shore Electric Railroad Company has been incorporated. Capital, $1,000. Directors, A. J. Johnson, Joseph C. Tone, Joseph A. Johnson, Frank W. Elwood and Edward S. Ellwanger, of Rochester; E. O. McNair and David W. McNair, of Warsaw.

WADSWORTH, OHIO.—The Wadsworth Electric Railway Company has been granted a franchise to construct, maintain and operate a street railway from Brooklyn Township to the south line of Cuyahoga County.

BOSTON, MASS.—The Cottage City Street Railway Company has been granted permission to issue $12,000 new stock.

GREENBUSH, N. Y.—The Albany and Albany, Greenbush & Bath railways have made application for franchise to operate electric cars. The village trustees have the same under consideration.

HUDSON, N. Y.—The Hudson & Kinderhook railroad are making efforts to extend their road to Nassau. If they should succeed an effort will be made to connect Nassau with West Sandlake by an extension of the electric road to Nassau.

SEYMOUR, IND.—The Madison Steel Railway Company's equipment and franchise has been purchased by New York capitalists, who will convert it into an electric line.

MECHANICSVILLE, N. Y.—An electric road is being built from Mechanicsville to Stillwater, and William R. Clothier, of Glens Falls, is superintending the construction of same.

WASHINGTON, D. C. — The electric road from Baltimore to Washington is to connect with Laurel, and a power house will probably be erected.

COLUMBIA CITY, IND.—The Ft. W., L. E. & C. C. electric railway has been incorporated with a capital stock of $300,000.

TOPEKA, KAS.—The Kansas City & Leavenworth Railroad Company has been incorporated by W. A. Bunker and H. A. Keefer, Kansas City; James C. Stone, Jr., John Hannon, and others, to build an electric line between these two cities. Capital stock, $500,000.

TROY, N. Y.—The Columbia County electric railway, recently incorporated with a capital stock of $400,000, to operate a street surface railroad between Hudson, Philmont & Stockport stations, has absorbed the Hudson electric railway and the Citizens' Electric Light and Power Company.

NEW YORK, N. Y.—The Nassau electric railroad has purchased two new engines at an expense of $50,000 for their plant at the Thirty-ninth street power house. General Manager Coleman has also ordered 200 open cars and 200 closed cars for next season's business.

Electric Light and Power.

JOHNSTOWN, N. Y.—George A. Streeter, of this place, and parties from New York, will soon erect a new electric plant here.

COLUMBUS, OHIO.—The Citizens' Light, Heat and Power Company has been incorporated. Capital stock, $200,000.

ONEIDA, N. Y.—The Central New York Light and Power Company has been incorporated. The capital stock is $100,000. The directors are H. Walter Webb and W. H. Glenshenen, of New York; J. W. Warner, of Oneida; William J. Arkell, of Canajoharie, and A. M. Young, of Waterbury, Conn.

PIERRE, S. D.—The Chamberlain Electric Light Company has been incorporated. Capital stock, $10,500. Directors, C. D. Tedrick, W. L. Montgomery, of Chamberlain, and G. W. Pitts, of Alton, Iowa.

BALTIMORE, MD.—The Equitable Electric Light Company, of Baltimore County, has been incorporated by Henry A. Parr, John Cowan, George R. Webb, J. William Middendorf and Richard R. Culbreth, with a capital of $50,000. The company is formed for the purpose of supplying electric light and power.

BLOOMINGTON, ILL.—Contracts were let recently for a new electric light building to be erected by the Bloomington Electric Light Company at a cost of $7,000. Every modern appliance will be put in.

CLEARFIELD, PA.—The Clearfield Light, Heat and Power Company has been incorporated. Capital, $5,000.

BAY CITY, MICH.—The Doran Lighting Company with a capital stock of $20,000 has filed articles of association. The stockholders are John G. Meyer, Reuben J. Eger, Robert L. Doran. It will be located in Bay City.

MARATHON, N. Y.—Electric lights will be established here.

LOS ANGELES, CAL.—E. E. Peck has organized an electric light company with a capital stock of $80,000.

SAN FRANCISCO, CAL.—Merced Falls Electric Power and Manufacturing Company has been incorporated by R. H. Dunham, Herman Jahn, J. T. Fleming, Augustus Laved, Alamada, Cal.; Basil Owen, London, England. Capital stock, $1,000,000.

BLOOMSBURG, PA.—The electric light plant is to be enlarged to provide greater capacity.

GREAT BEND, IND.—Roosa & Galloway are contemplating the establishment of an electric light plant.

DUBLIN, GA.—James B. Sanders, Mayor, can give information concerning construction of an electric light plant, with a capacity of 100 arc and about 3,000 incandescent lights.

SANTA FE, N. M.—Nambe Power and improvement Company, incorporated by L. A. Hughes, T. J. Helm, J. W. Akers, M. G. Reynolds, to transmit 400 horse-power from the Nambe Falls, about 25 miles from Santa Fe. Capital stock, $30,000.

UNION SPRINGS, ALA.—D. A. Sissiuns, Mayor, can give information concerning establishment of an electric light plant, for which franchise has been asked.

TACOMA, WASH.—The city electric plant is to be improved at a cost of $10,000.

BELLEFONTAINE, OHIO.—Electric lights are to be established here.

PALMYRA, N. Y.—An electric light plant is to be established here.

PROVIDENCE, R. I.—The People's Edison Electric Illuminating and Power Company are contemplating placing a new engine in their power station soon.

PASCOAG, R. I.—An electric light plant is being placed in the Harrisville mill.

LYNDONVILLE, VT.—An electric light plant is to be established here immediately.

SLEEPY EYE, MINN.—The contract for the new electric light and waterworks building was let to A. McLeod & Company, of Minneapolis.

OMAHA, NEB.—The South Omaha Electric Light, Heat and Power Company has been purchased by the South Omaha Water Works Company, of which John A. McShane is president and B. S. Scannell, secretary.

LAFAYETTE, IND.—The Merchants' Electric Lighting Company has been organized with C. H. Ankeny, president; F. B. Shepard, vice-president, and Henry Rosenthal, secretary and treasurer.

New Telephone and Telegraph Companies.

NEW YORK, N. Y.—The Wilson-Bates Electric Company has been incorporated to manufacture telephones and all kinds of electrical or magnetic machinery. Capital, $1,500. Directors: William C. Wilson, George B. Bates and Henry G. Issertel, of New York city.

VANDERGRIFT, PA.—The Vandergrift Gas, Fuel, Telephone, Electric Light and Power Company, capitalized at $8,000, has been incorporated. The directors are S. H. Vandergrift, J. L. Buchanan, D. I. Rhodes, George Mercer and V. Preston, of Pittsburgh.

CATSKILL, N. Y.—The Catskill Mountain Telephone Company has filed a certificate of the following extension of its route: From Windham to Deerham, to Greenville, to Cairo, to Catskill, to Tannersville, to Palenville, to Jewett, to Ashland, all in Greene County. It has also increased its capital stock from $1,400 to $3,500.

CAIRO, ILL.—The Cairo Telephone Company has been incorporated (capital stock, $5,000) to operate a telephone plant. Incorporators: Thomas W. Gannon, Angus Leek and Frank J. Fitzgerald.

PUEBLO, COLO.—A. G. Holland is trying to secure subscribers to a new local telephone exchange.

New Manufacturing Companies.

NEW YORK, N. Y.—The New York Fare Register and Supplies Company has been incorporated to manufacture fare registers for passenger cars. Capital, $50,000. Directors, Andrew H. Hogg and James Brady, of Brooklyn, and William K. Jewitt, of New Brighton.

NEW YORK, N. Y.—The Electric Arc Light Company has been incorporated. Capital stock, $125,000. Directors, Lionel Sutro, Louis B. Marks and Horace C. Skelly.

CHICAGO, ILL.—Victor Electric Company has been incorporated. Capital stock, $2,400. Incorporators, C. F. Sammis, J. B. Wantz and E. P. Vickers.

MINNEAPOLIS, MINN.—The Marine Electric Propeller Company has been incorporated. The capital stock is placed at $27,500, and those composing it are: J. Frank Conklin, S. N. Smith, Frank F. Davis, Ary E. Zonne and Floris E. Zonne.

CAMDEN, N. J.—Shuttleworth Electric Company has been incorporated with a capital stock of $100,000.

Business Troubles.

WATERBURY, CONN.—The Billings Manufacturing Company has assigned to Thomas F. Lawlor. The company made electrical and horological specialties.

Mr. Morris W. Mead, superintendent of the Pittsburgh, Pa., Bureau of Electricity, has issued to architects, electrical contractors and others in his city a neatly prepared "Manual," in which are classified all the laws and ordinances governing electrical affairs in the city of Pittsburgh, together with a full and complete code of rules and regulations adopted by the Department of Public Safety, and approved by councils and the Mayor. It is sent out for information and guidance in practical building work. These laws, rules and regulations have been in force since September 1. The National Electric Light Association's rules for the installation of electric light and power plants are included in the "Manual."

ADVERTISING POINTERS.

Be sure your goods are right—then advertise.

A crisp, brief, refined and polite ad. is the best. Remember that business talk as reflected by printers' ink is like an untouched photograph—the defects are prominent.

Time spent in preparing advertising matter is not lost—it often means a dividend.

Poorly drawn and poorly executed advertising cuts are worse than none.

It is just as important to have your advertisement well-dressed typographically as it is that your star salesman should be well groomed.

Are you the kind of a man who would buy the confidence man's gold bricks at 50 cents on the dollar? No? Then don't expect a good ad. to sell poor goods.

Questions are attractive things. Use a few judiciously in your ads.—human nature is curious.

Ideas are high-priced commodities. Therefore, don't hesitate to spend money for advertising ideas.

New and attractive type faces are put on the market every week. The up-to-date printer has a standing order for them—he's the man to set up your ads.

White space around an ad. is the most expensive thing you can use—that's why it's the best thing.

Despise not the advertising solicitor. You can make him your best friend.

Refinement in advertising is usually indicative of the goods advertised. The reverse of this proposition may also be true.

It is next to impossible to place an attractive ad. where it won't be seen—position doesn't count for everything. True of advertising as well as society.

The cardinal rules of business are these: 1. Make good goods. 2. Advertise. 3. Advertise. 4. To infinity—advertise.

There are many large and wealthy firms who employ no salesmen except printers' ink.

A money saving difference between a human salesman and a printers' ink salesman: The latter's expense account is a fixed charge and it is working every minute simultaneously in many places.

Do you arrange your goods attractively in the store? Why not do as much for your advertising?

"A straight line is the shortest distance between two given points." You learned that at school. Now learn the modern version: "A good ad. is the straight line between seller and buyer."

OUR BOSTON LETTER.

An instance of the utility of electrical transmission of power was given a few days ago, when one of the large factory buildings of the Sturtevant Blower Works, at Jamaica Plain, was moved 300 feet while in full operation. The removal was necessitated by the track elevation now going on along the Providence division of the N. Y., N. H. & H. road, and while it was under way, work in the big three story building was carried on as usual, power being supplied by a 20 horse-power motor belted to the main line of shafting on the second floor. Connection between the motor and the generator, which was in a separate building, was maintained by means of a reel, which allowed the feed wire to pay out as the building moved along. It was certainly a novel exhibition of the transmission of power, and is probably the first case on record of a manufacturing building of this size, 350 x 50 feet, being moved from its foundations without stopping the machinery.

The town of Blackstone, Mass., is liable to be in darkness for some little time as a result of their persistent endeavors to reduce the cost of lighting. Through the State Gas and Electric Light Commission, and later, the courts, matters have been made very uncomfortable for the past six months, until the Woonsocket Electric Machine and Power Company, who have been furnishing the lights, have at last notified the selectmen that they would immediately cease to exercise their franchise in the town and would remove their poles, wires and lamps. The electric light committee are now hustling around for bids from other parties. They need about thirty 2,000 candle-power lamps.

The Woburn Electric Light Company, whose plant was recently advertised for sale, have secured a postponement for a short time, in the hope of being able to wipe out their indebtedness and hold the property. H. G. T.

Boston, October 10.

Telephone Induction Coils.

Standard 250 ohms. Wound with best quality silk-covered wire. Price 50 cts. Lots of 100 or more 45 cts. Send 50 cts. for sample, which will convince as to quality and workmanship. Sample sent postpaid.

Miss Jessie Mason,
Sumter, S. C.
P. O. Box 26.

Henkle's Turbine Scheme.

The daily newspapers have lately had considerable to say about a new turbine scheme devised by Leonard Henkle, of Rochester, N. Y. This is how Mr. Henkle himself explains the scheme:

To the Editor of Electrical Review:

* * * My great plans at Niagara Falls had heretofore contemplated the development of 1,000,000 horse-power by the old turbine-wheel system, under a 28-foot head; but now, with my new combination of 138 pairs, I shall get over 14,000 horse-power from each group, or 2,000,000 horse-power in all from the same head.

There will be 138 groups of wheels, with four in each group, or 552 in all. They are to be made of aluminum and hung in such a manner as to cut off nearly all friction; in fact, it is intended to reduce the usual loss of transformation from water power to electrical energy down to the lowest possible point, so that, with my new wire, which is of such atomic formation as to preclude nearly all the usual resistance found in copper, and with my absolutely perfect insulation, it is expected that no less than 1,800,000 horse-power may be transmitted to various remote points. But still, after all, the people at the Falls, at Tonawanda and Buffalo, will, in due time, conclude to use it all to build up a most magnificent city at home.

Please excuse this digression from the turbine-wheel subject. The wheels are such that they can be used anywhere as well as at the Falls, and to derive double the present force from the water.

Fraternally yours,
Leonard Henkle.
Rochester, N. Y., October 3.

MEDBERY INSULATION AND
ALUMINUM BRONZE OVERHEAD TROLLEY EQUIPMENT FOR
Best in the World. **ELECTRIC RAILWAYS.**

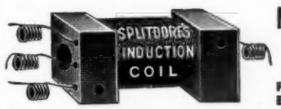
MEDBERY SWITCHES OF ALL KINDS.
QUICK AND SLOW BRAKE.

New York.
Philadelphia.
Chicago.
San Francisco.

"PONY" Switch.
15, 25 and 35 Amp.

THE FIBERITE CO.,
Mechanicville, N. Y.

INDUCTION COILS.



MAGNET SPOOLS.

For Arc Lamps, Telephones, Telegraph Apparatus, Electric Bells, Annunciators and Electric Motors.

C. F. SPLITDORF, Manufacturer, 17-27 Vandewater St., N. Y.
FINE WIRE WINDING OF EVERY DESCRIPTION.

MESCO DRY BATTERY.

A standard battery for all open circuit or intermittent work. Highly recommended for Telephone Transmitters.

OVER 230,000 SOLD DURING THE PAST YEAR.

For sale by nearly all the Electrical Supply Houses in the United States.

GIVE IT A SEVERE TEST. Unreliable Dry Batteries are not sold much cheaper than the MESCO.

64-Page Pamphlet Free. Catalogue, 208 pages, 10 cts.

MANHATTAN ELECTRICAL SUPPLY CO.,
32 Cortlandt Street, New York.

AGENCIES:

ELECTRIC APPLIANCE CO., CHICAGO, ILL.
PETTINGELL-ANDREWS CO., BOSTON, MASS.
ELECTRICAL ENGINEERING CO. MINNEAPOLIS, MINN.
ST. LOUIS ELECT'L SUPPLY CO., ST. LOUIS, MO.
BRADFORD BELTING CO., CINCINNATI, O.

PHILLIPS INSULATED WIRE CO.,
NEW YORK OFFICE: 39 & 41 Cortlandt Street.
FACTORY: PAWTUCKET, R. I.

TO OUR FRIENDS:

After a continuous run, excluding Sundays, of a thousand hours, we have almost caught up with our orders, which since our fire have been nearly twice as large as ever before.

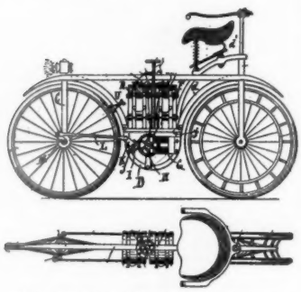
We have also nearly replaced our stock of parts and are therefore able to serve our customers with greater promptness than has recently been possible.

Yours very truly,
Crocker-Wheeler Electric Co.,
39 Cortlandt St., New York. S. S. Wheeler, *President.*

ELECTRICAL PATENTS

ISSUED OCTOBER 8, 1895.

547,441 Electric bicycle; H. W. Libbey, Boston, Mass.—A front driving wheel and a rear double tread steering wheel connected together by a loop frame, an electric battery and an electric motor secured to said frame between the wheels, the motor being under the battery and gears, cranks and connecting rods to transmit motion to cranks on the axle of the driving wheel.

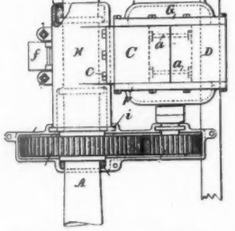


No. 547,441.—ELECTRIC BICYCLE.

547,460 Telephone system; F. D. Shepherd, Milwaukee, Wis.

547,476 Motor truck; J. A. Brill, Philadelphia, Pa.

547,536 Electric car lighting apparatus; W. Biddle, Brooklyn, N. Y.—Field magnets having divided poles and integral plates connecting the half poles together in pairs and means for securing the half poles together, and covers bolted to the plates and forming with them an inclosure for commutators and armature.



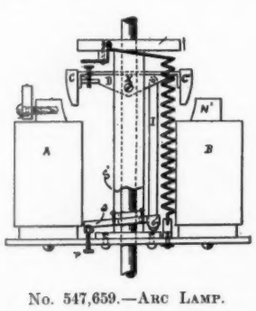
No. 547,536.—ELECTRIC CAR-LIGHTING APPARATUS.

547,537 Electric car lighting; W. Biddle, Brooklyn, N. Y.

547,564 Current motor; O. A. Petterson, Contention, Oregon.

547,568 Electric key action for pianos; E. S. Votey, Detroit, Mich.—Oscillatory connection plates provided with conductor bars, a stop actuated rod engaged with each of said plates, and key actuated bars constructed to contact with said conductor bars.

547,613 Telephone switch; W. M. Miner Plainfield, N. J.—A switch lever having two positions, a lock for the same when in one position, said lock being operated by the weight of the receiver when in its normal position and the lever when in its other position, barring the receiver from its normal position.



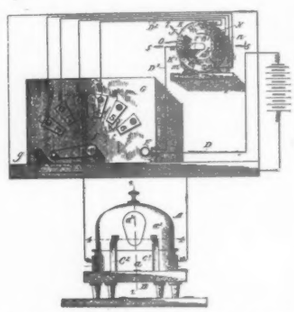
No. 547,659.—ARC LAMP.

547,659 Electric arc lamp; H. E. Bradley, Pawtucket, R. I.—An electro-magnet having a secondary adjustable armature, non-magnetic screws for adjusting the same, pins for holding said screws in the armatures, and pole-pieces tapped to receive said screws.

547,660 Insulator pin and insulator; C. F. Carroll, Manistee, Mich.—An insulator pin constructed long enough to pass through the cross-arm of a telegraph or telephone pole, an insulator on the lower end to act both as an insulator and a fastener with the cross-arm.

547,683 Phase modification; H. A. Rowland, Baltimore, Md.—Consists in producing a continuous current from an alternating one by means of a commutating device in synchronism with the current and gradually increasing the frequency of the current by slowing down the commutating device until it comes to rest.

547,714 Time controlled electric heater; L. E. Custer, Dayton, Ohio.—An electro-receptive device or muffle, a rheostat, and mechanism actuated by clockwork for throwing the various resistance of the rheostat successively into the circuit.



No. 547,714.—TIME CONTROLLED ELECTRIC HEATER.

547,753 Cut-out for arc lamps; D. Higham, Boston, Mass.—An electric arc lamp provided with suitable feeding mechanism having shunt windings, with a carbon rod having a groove, a lever having a pawl to engage with said groove when the carbon rod is fed down and open the circuit of said shunt windings, and a second pawl to engage with said groove when the rod is pushed up by hand to close the circuit of said shunt windings.

547,755 Automatic telephone system; G. K. Hutchins, Baltimore, Md.—A primary switch, a pilot switch, a double line wire, passing through the pilot switch, and means for governing the movements of said primary switch through the pilot switch.

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REFERENCES: "Electrical Review," New York; Paul Cromlein, Teller Lincoln National Bank, Washington, D. C.; Judge Geo. D. Parker, Berkley, Va.; Second National Bank, Washington, D. C.; E. K. Leech, U. S. Mint, Philadelphia, Pa.; W. F. Newell, Manager and Secretary Water Works, Olympia, Oregon.

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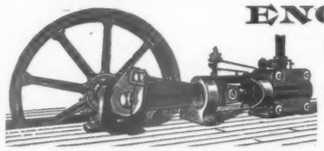

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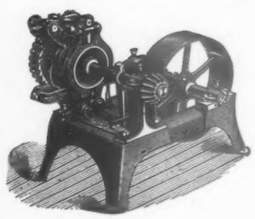

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AMONG ELECTRICAL INVENTORS.

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Edison, in addition to developing his ore-separating system, is endeavoring to find a use for the immense quantities of culm on his property at Edison, N. J., as fuel for generating electricity.

Stephen D. Field is farming at Stockbridge, and also doing some effective work in telephonic and telegraphic lines.

John A. Barrett is developing an electric horseless wagon. Look out for it.

Gilliland, in his laboratory at Pelham Manor, N. Y., is again concentrating his inventive brain on advanced telephonic apparatus.

Brush devotes more time to banking matters than to anything else.

Hiram Maxim still believes in his flying machine, and devotes much time and thought to it.

Tesla, with his magnificent new laboratory, is working harder than ever. What is he doing? Ask him.

Stanley, as restless and progressive as ever, is said to be looking for new fields to conquer. His system, so admirably manufactured at Pittsfield, Mass., is growing more popular every day.

Westinghouse is happy over his new and very promising child—the gas engine.

Bell is living quietly at Washington, D. C., taking a great interest in the practical developments in the telephone field.

Elisha Gray is developing his telautograph and has a sustaining faith that it will yet find a wide field of practical application.

Weston continues to develop his apparently perfect instruments of precision.

Wood, at Fort Wayne, is as busy as ever on improved dynamos, transformers and arc lamps. Like the great Napoleon, his work is right the first time — his first drawings being the ones from which the apparatus is always made.

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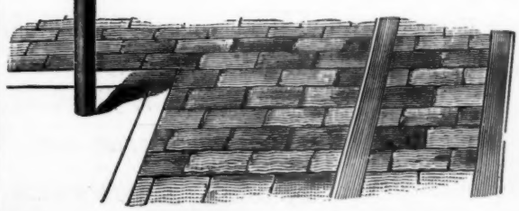
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The Electric Storage Battery Company, of Philadelphia, is getting together some unusually convincing arguments to show street railway men the advantages of an accumulator plant as an adjunct of the modern electric power station. The company will be ably represented at the Montreal convention.

The New Haven Car Register Company, of New Haven, Conn., expect to have on view at the Montreal Street Railway Convention a handsome exhibit of their line of fare registers. Some of the largest street railway companies in the country use the New Haven registers, which have been strongly endorsed.

The Okonite Company, 13 Park Row, New York, will be strongly represented at the Montreal Street Railway Convention. Captain Willard L. Candee will be there as well as other representatives of the company. The Okonite feeder cables have made an enviable reputation among street railway men.

Mr. D. P. Perry, general manager of the Standard Electric Company, Chicago, naturally feels elated over the handsome installation now in course of erection for lighting Snake Hill boulevard in Jersey City, for the contract calling for an entire equipment of 320 Standard arc lamps was only secured after a year's litigation and fiercely contested competition.

The Lombard Water Wheel Governor Company, 61 Hampshire street, Boston, report that they are now governing some water wheels within one per cent. The Lombard governor, which is installed under an absolute guarantee, is capable of holding the speed of any water wheel within three per cent under any variation of load. The company issue a convincing book of testimonials.

Suits for Infringement of Underground Electric Railway Patents.

Elias E. Ries, of Baltimore, Md., and Albert H. Henderson, of Philadelphia, Pa., have sued the Metropolitan Traction Company, of New York, and the Metropolitan Railroad Company, of Washington, D. C., respectively, for infringement of patents relating to underground conduits for electric railways. The bills of complaint were filed in the Circuit Court for the Southern District of New York on September 17, 1895, and in the Circuit Court for the District of Columbia on October 3, 1895, respectively, through complainants' counsel.

It is alleged that the electric conduit railway line recently constructed for the Metropolitan Traction Company and now in regular operation on Lenox avenue, New York city, as well as the underground conduit railway built by the Metropolitan Railroad Company and in successful operation on its Ninth street line in Washington, D. C., severally constitute a direct infringement and violation of certain basic letters patent granted to Mr. Elias E. Ries and owned by the complainants, covering essential features which are used in the construction of the roads in question, and upon which their practicability and successful operation depend.

The patents upon which suit has been brought and which it is alleged are infringed are seven in number as follows:

No. 388,556, granted March 23, 1886, conduit for electric and cable railways; No. 370,283, granted September 20, 1887, underground conduit for electric and other railways; No. 383,770, granted May 28, 1888, underground conduit and collectors for electric railways; No. 386,085, granted July 10, 1888, electric railway; No. 386,087, granted July 10, 1888, combined electric railway and wire conduit; No. 409,756, granted August 27, 1889, electric-railway crossing; No. 409,757, granted August 27, 1889, underground conduit for electric railways.

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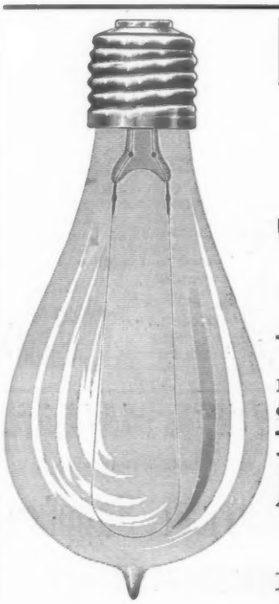
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